Part II:
Habitat Restoration Strategies
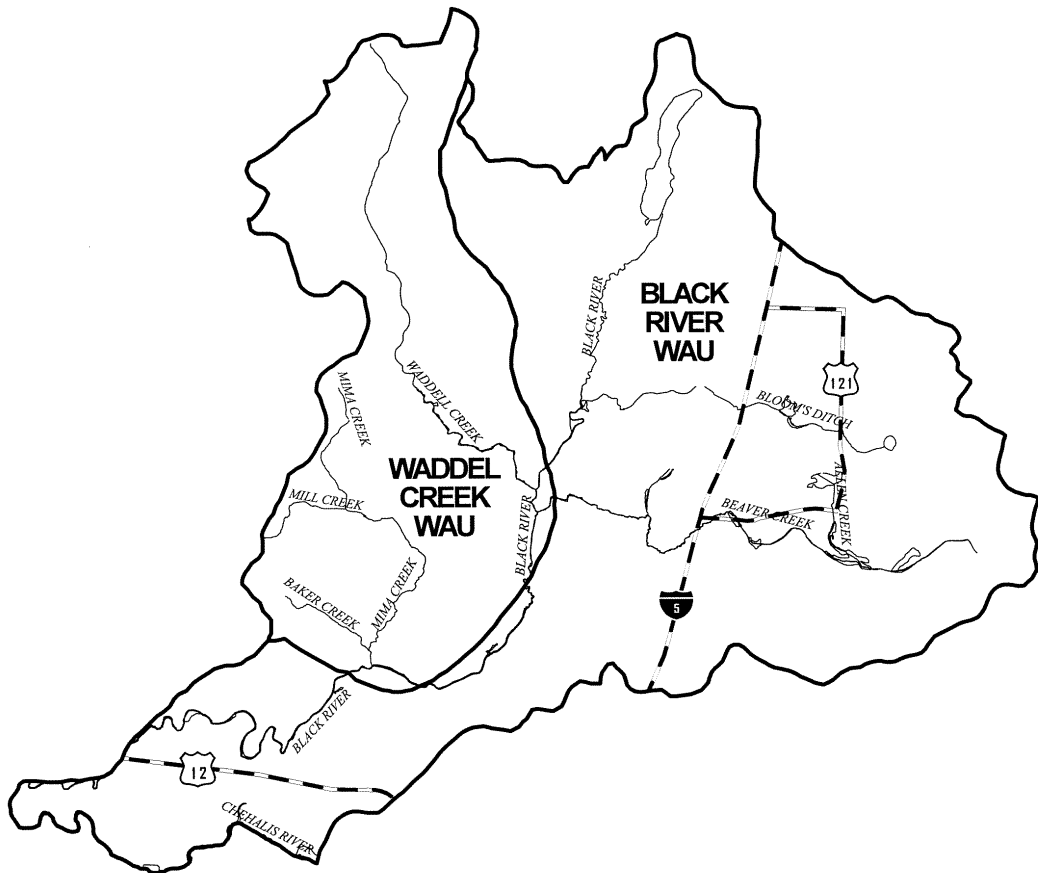
Black River Subbasin

WAU Acreage	88,758.7 acres
WAU's	Black River, Waddel Creek
Major Tributaries	Mima, Waddel, Salmon, & Beaver Creeks
Major Land Uses	Suburban & rural residential, agriculture, & forestry
Landownership	Private
Number and Type of Anadromous Fish Stocks	4: fall chinook, chum, coho, winter steelhead
Number of Anadromous Fish Habitat Miles	72.38 miles
Chehalis Watershed Subbasin Priority	High
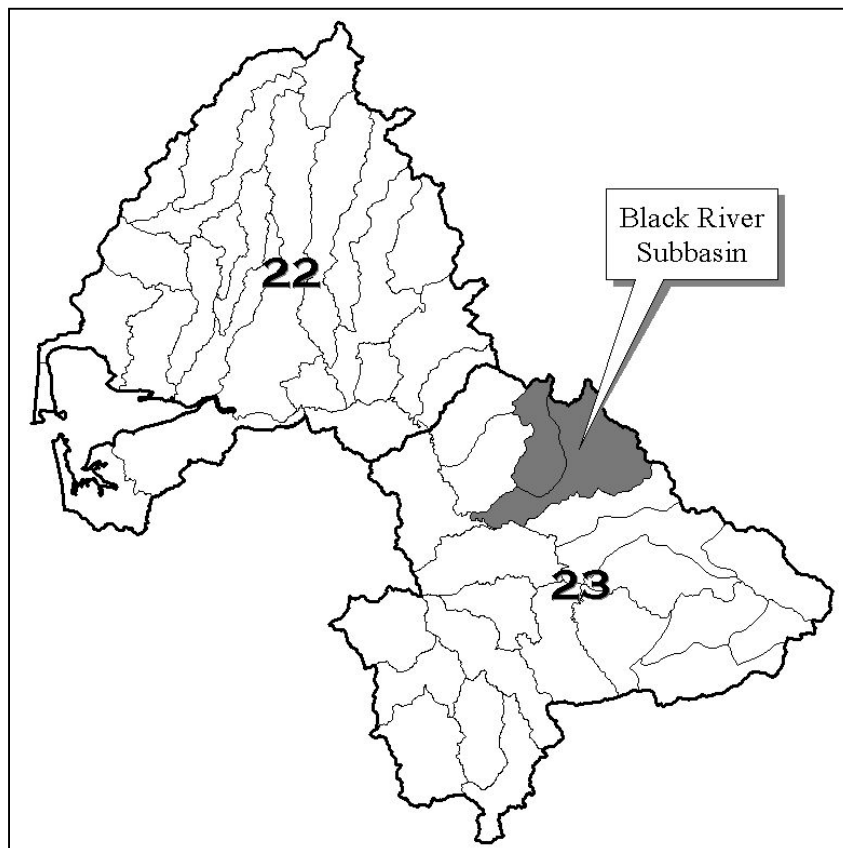
Black River Subbasin

BLACK RIVER WAU

WADDEL CREEK WAU

MIMA CREEK

WADDELL CREEK

MILL CREEK

BAKER CREEK

MIMA CREEK

BLACK RIVER

BLACK RIVER

BLOOM'S DITCH

BEAVER CREEK

BLACK RIVER

CHEHALIS RIVER

N

4   0   4 Miles
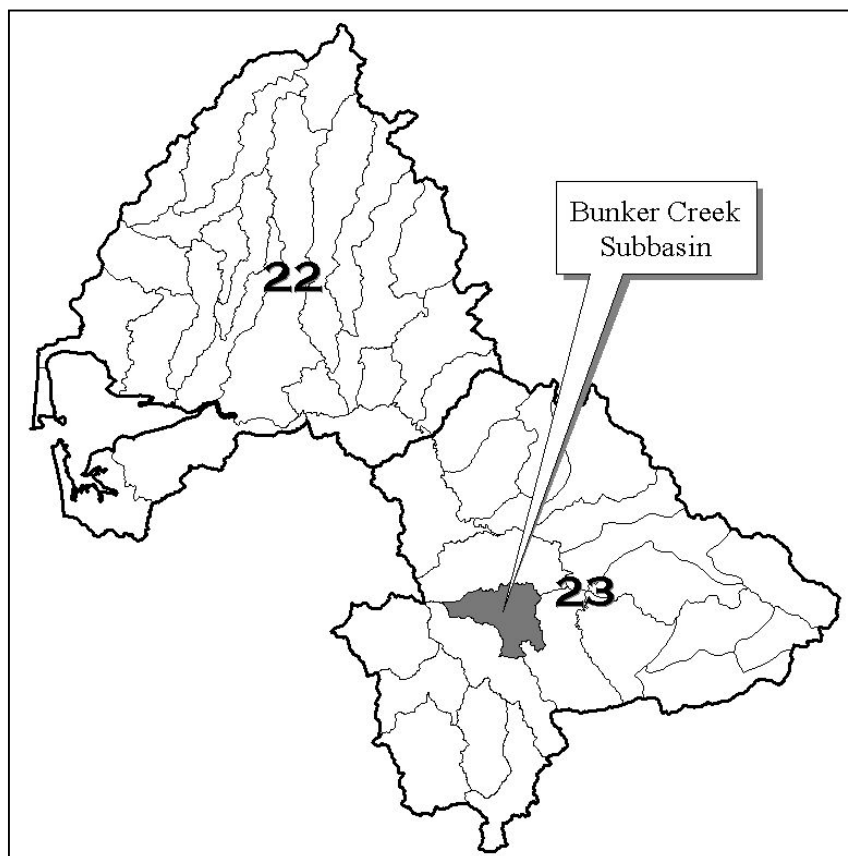
Black River Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

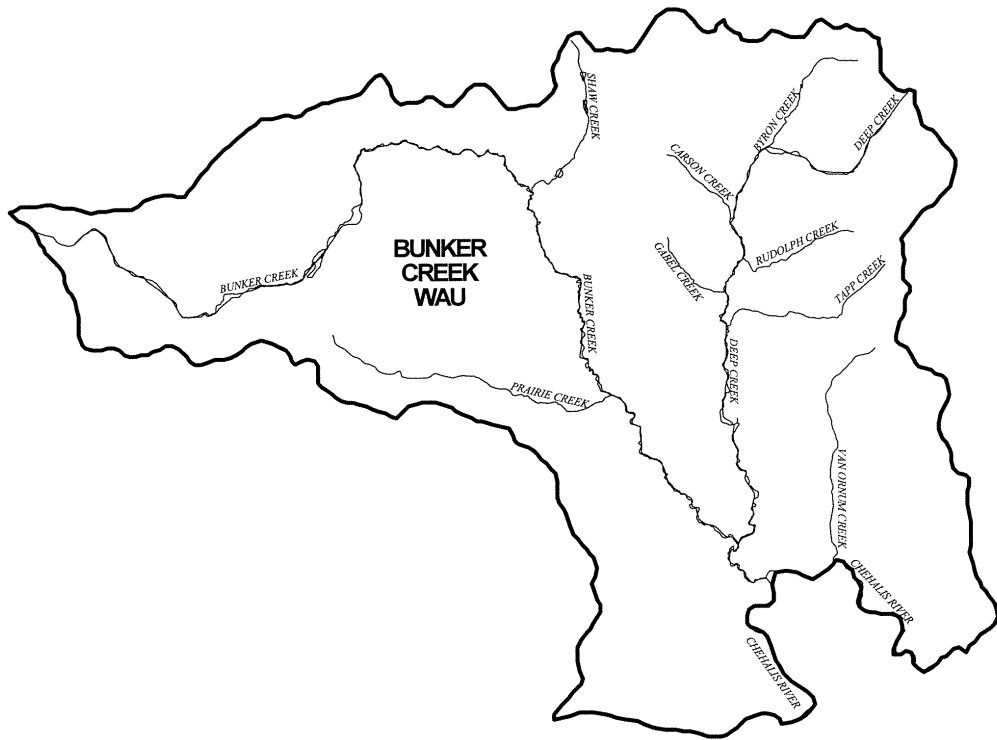| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	Poor (DG) Known problems: largest problem is blockage to Black Lake (access and flow issue)	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M –** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **L –** Develop a database housed with the lead entity, to contain all blockage data. **H –** Study flow control between upper Black River and Black Lake, considering fish passage to and from Black Lake to Black River. Include study of potential predation by exotic species in Black Lake.
Floodplain Conditions	DG, Poor in Beaver, Salmon, Allen Creeks and in Bloom's Ditch. Known problems include rip-rap, wetland filling, and channelization.	**H -** Reconnect potential off-channel habitat. **L -** Restoration actions need to increase instream LWD. This includes appropriate riparian restoration to result in better future LWD levels.	**H -** Maintain and conserve off-channel and side channel habitat and associated riparian.	**H –** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). Known problems: bank erosion, livestock access, high road density (4.1 mi/sq mi).	**H –** Reduce bank erosion (riparian restoration, livestock exclusion, engineered logjams to deflect flows from eroding banks., etc). **H -** Reduce livestock access to streams. **H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **M -** Provide education regarding the impacts of livestock access.		**H –** Inventory roads and assess impacts to salmon and steelhead as well as prioritize restoration actions. **H –** Stream surveys of key tributaries to Black River (Waddell, Beaver, Miraz, Salmon Creeks) should evaluate spawning and rearing conditions, including sediment, channel conditions and LWD.
LWD	DG. Low gradient and numerous wetlands likely result in lower priority for LWD.	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	L – DETERMINE APPROPRIATENESS THROUGH INVENTORY OR OTHER ASSESSMENT OF LWD, OR OTHER NATURAL STRUCTURE(S), PLACEMENT. (E.G. GRAVEL RECRUITING, HYDROLOGY, WOOD OR STRUCTURE SIZE, GRADIENT, NEAR TERM LWD RECRUITMENT POTENTIAL, AND VALLEY CONFINEMENT).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Mixed. Poor and Good.	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas. **H** - Restore riparian vegetation/buffers in lower 9 river miles and between RM 17-20, and key tributaries where conditions are poor, such as Waddle/Beaver Creeks.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H** - Preserve good riparian conditions from RM 9-17 and above RM 20 and in key tributaries.	**H** – Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Poor. (DG most tribs). Known problems are warm water temperatures and low dissolved oxygen due to poor riparian, livestock waste, urban stormwater, and loss of flow from Black Lake.	**H** - Actions need to address riparian, livestock access, and flow problems. **H** - Reduce livestock access to streams. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Implement TMDL for water temperature and pH. **H** - Restore wetlands and off-channel habitat. **H** - Restore summer/low flows from Black Lake to Black River after analysis.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Analysis of potential flow controls in upper Black River near Black Lake to increase flow in low flow periods.
Water Quantity	Poor. (DG most tribs). Known low flow problem due to flow reversal to Black Lake.	**H -** Reduce water withdrawals from both surface and ground sources. **H** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H** - Restore wetlands and off-channel habitat**.** **H** - Restore summer/low flows from Black Lake to Black River after analysis.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. Hydrological maturity should be a goal in the upper reaches of Mima and Waddell Creeks and aquifer recharge in the Black River, itself.	**H** – Analysis of potential flow controls in upper Black River near Black Lake to increase flow in low flow periods.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H –** Increase field surveys for salmonid distribution, escapement, and habitat use by life history stage. **L –** Assess marine-derived nutrient processes.

Bunker Creek Subbasin

WAU Acreage	26,723.6
WAU's	Bunker Creek
Major Tributaries	Deep Creek
Major Land Uses	Agriculture and rural residential
Landownership	Private
Number and Type of Anadromous Fish Stocks	2: coho, winter steelhead
Number of Anadromous Fish Habitat Miles	10.72 miles
Chehalis Watershed Subbasin Priority	Low

Bunker Creek
Subbasin

BUNKER
CREEK
WAU

BUNKER CREEK

SHAW CREEK

CARSON CREEK

BYRON CREEK

DEEP CREEK

RUDOLPH CREEK

GABEL CREEK

TAPP CREEK

BUNKER CREEK

DEEP CREEK

PRAIRIE CREEK

VAN ORNUM CREEK

CHEHALIS RIVER

CHEHALIS RIVER

N

2   0   2 Miles
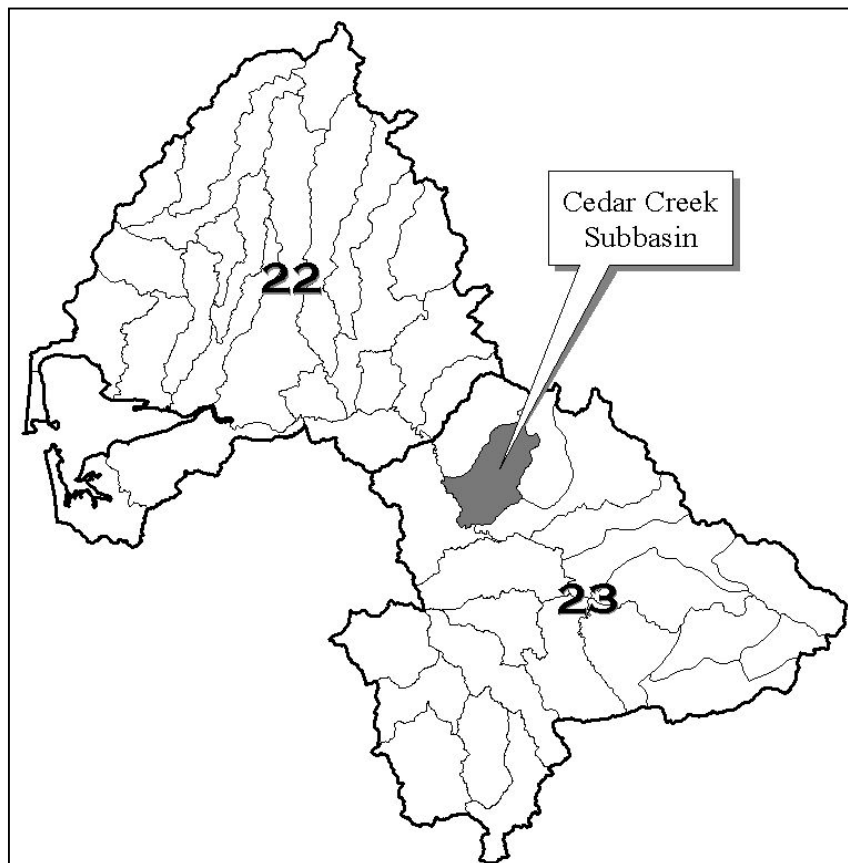
Bunker Creek Subbasin
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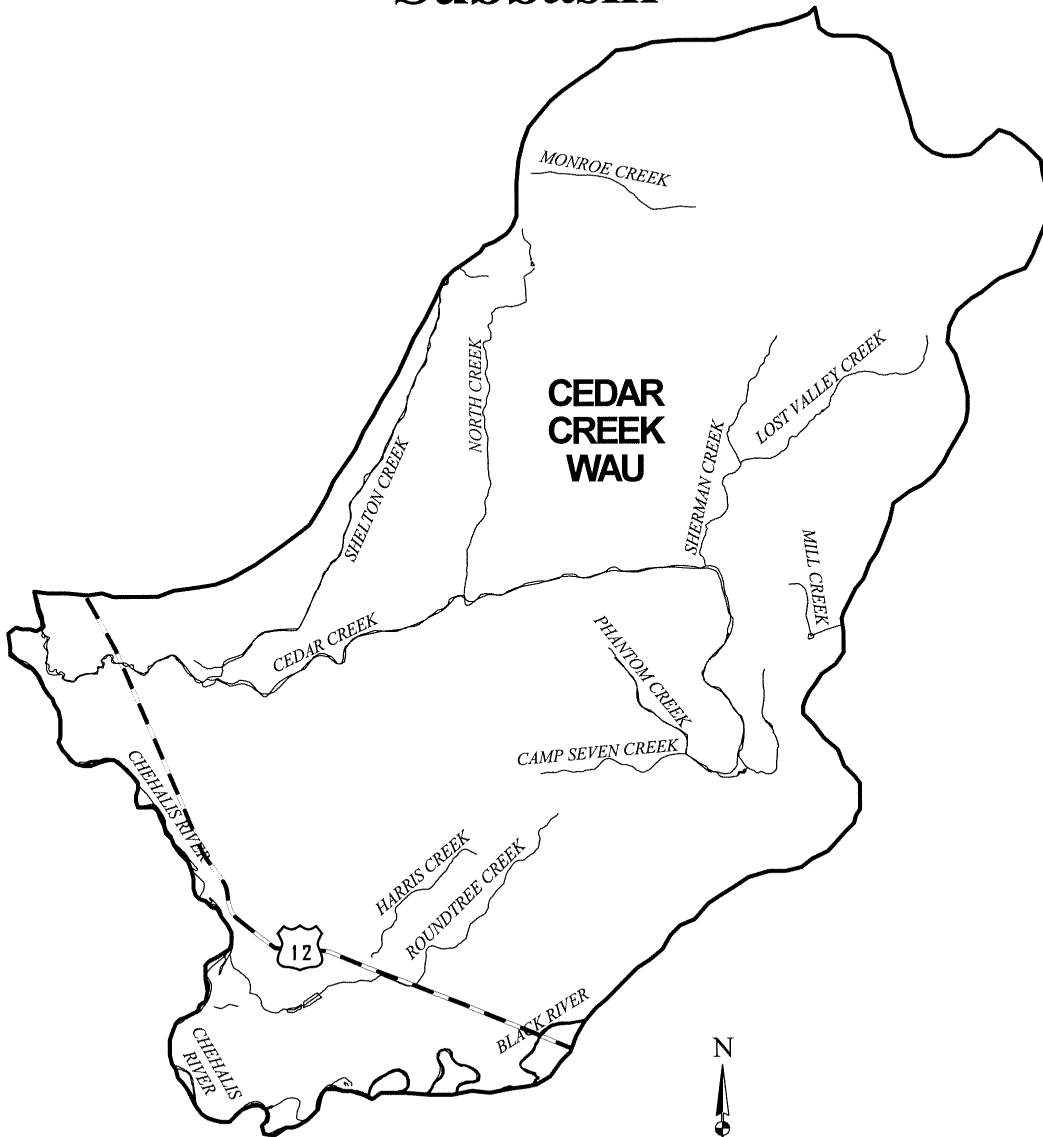| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG High road density (4.4 mi/sq.mi)	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H –** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H –** Develop a database housed with the lead entity, to contain all blockage data. **H –** Need fish presence assessments
Floodplain Conditions	Fair (DG) Channel incision, scour, roads within floodplain	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H -** Maintain and conserve off-channel and side channel habitat and associated riparian.	**H –** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG) Siltation, high road density, high levels of bank erosion, livestock access, vehicle activity	**H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H –** Reduce livestock access to streams. **M -** Provide education regarding the impacts of livestock access. **L -** Provide education regarding the impacts of vehicle activity in streams and increase enforcement.		**H –** Inventory roads and assess impacts to salmon and steelhead as well as prioritize restoration actions. **H –** Livestock access and bank erosion information is old and needs updating.
LWD	DG Lack of LWD	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H –** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement) **M –** Assess instream levels of LWD.
Riparian	Poor (DG). Area converted to non-forest, streamside vegetation loss due to logging	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H –** Assess and prioritize recovery and protection for riparian conditions. Needs more data on riparian conditions

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	Poor. Low dissolved oxygen caused by livestock access, failing septic systems, fecal coliform (suggesting high BOD loads). Poor riparian conditions suggest temperature problems.	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce livestock access to streams. **H** - Implement TMDL for water temperature and pH. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Monitor summer water temperatures and dissolved oxygen.
Water Quantity	Poor. Low summer flows, irrigation, high peak flows, scour, converted land cover	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Install stream flow gage, and monitor stream flow. **H** – Determine actual water usage and water rights.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H –** Increase field surveys for salmonid distribution, escapement, and habitat use by life history stage. **L –** Assess marine-derived nutrient processes.

Cedar Creek Subbasin

WAU Acreage	34,186.5
WAU's	Cedar Creek
Major Tributaries	Shelton, Sherman, Monroe, and Fall Creeks
Major Land Uses	Forestry, rural residential
Landownership	Public (Capital State Forest) & private
Number and Type of Anadromous Fish Stocks	2: coho and fall chinook
Number of Anadromous Fish Habitat Miles	18.48 miles
Chehalis Watershed Subbasin Priority	Low

Cedar Creek
Subbasin

MONROE CREEK

NORTH CREEK

**CEDAR
CREEK
WAU**

SHELTON CREEK

LOST VALLEY CREEK

SHERMAN CREEK

MILL CREEK

CEDAR CREEK

PHANTOM CREEK

CHEHALIS RIVER

CAMP SEVEN CREEK

HARRIS CREEK

ROUNDTREE CREEK

12

BLACK RIVER

CHEHALIS RIVER

N

2   0   2 Miles
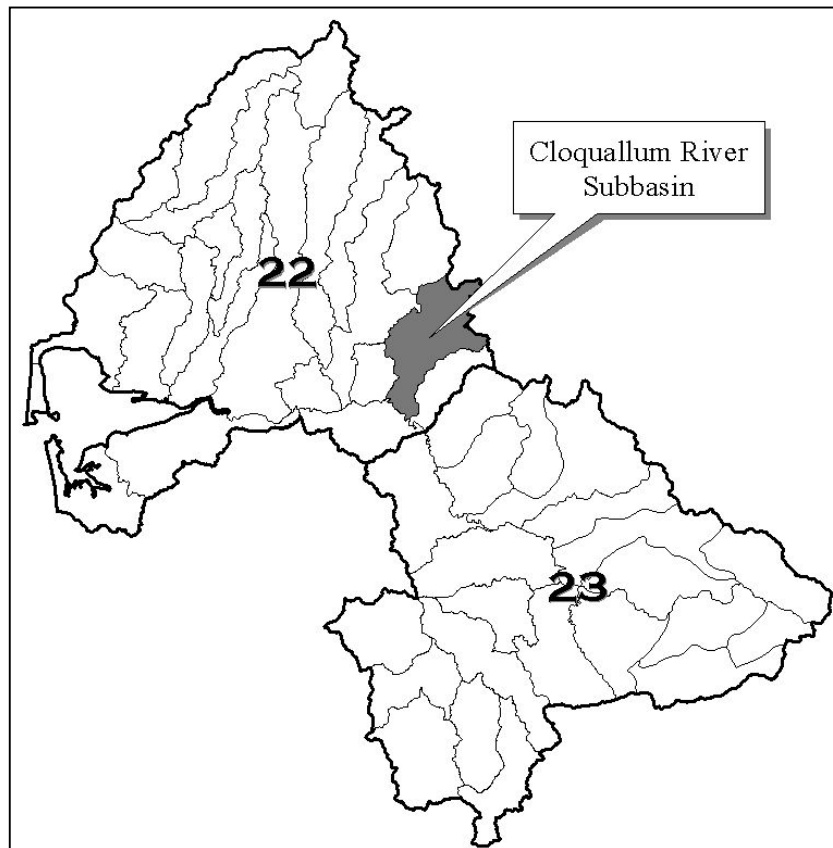
Cedar Creek Subbasin
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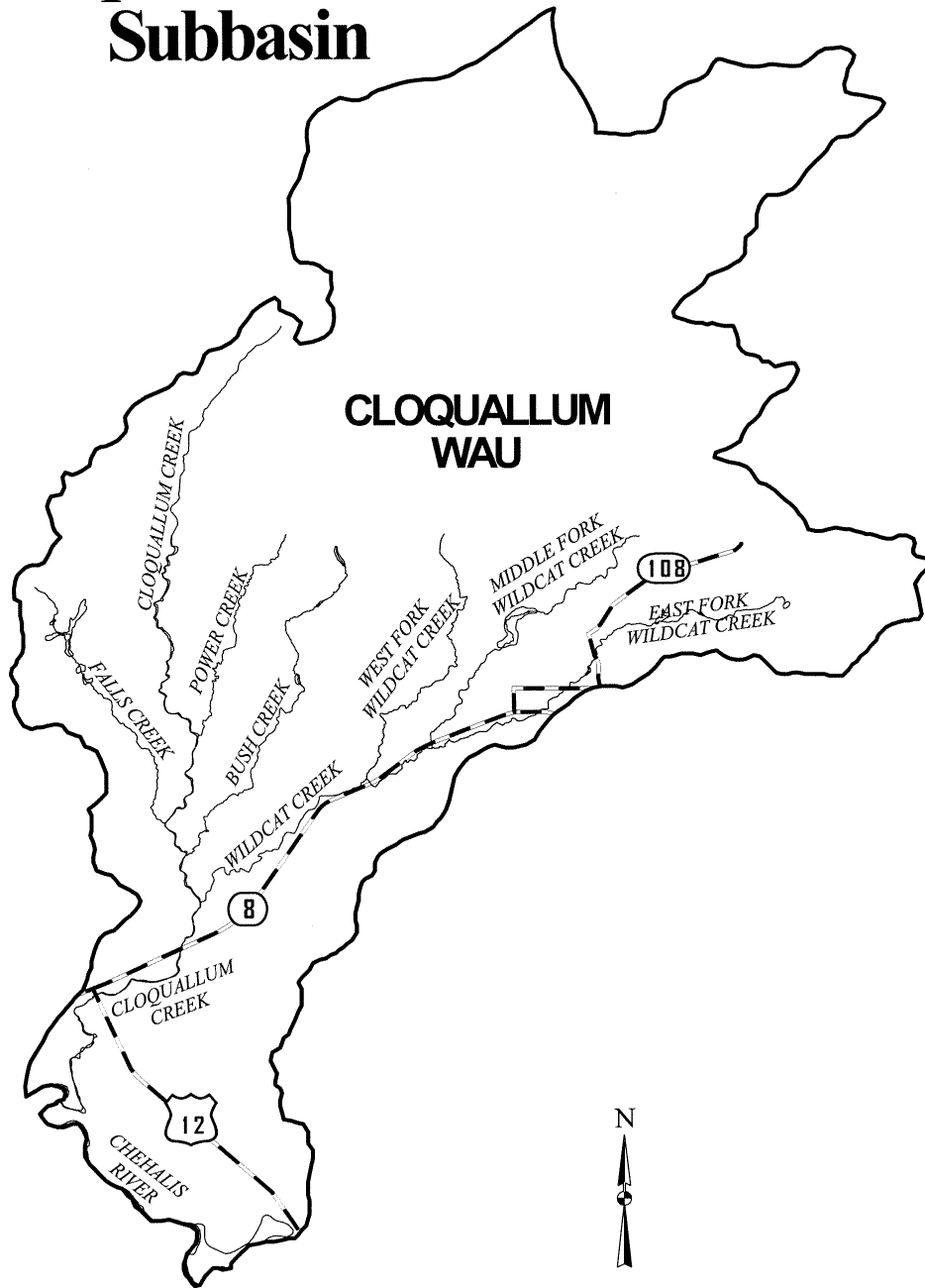| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG Road density is fair (2.9 mi/sq mile).	**H** - Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H** - Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages. **M** – New culvert structures should be sized to reflect expected increased flows. (High 20 – 30 year precipitation cycle expected).		**M** - Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. Specific to this Subbasin: the Cedar Creek Correctional Facility dam needs further assessment. **M** - Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG)	**H** - Reconnect potential off-channel habitat.	**H** – Maintain and conserve off-channel and side-channel habitat and associated riparian.	**H** - Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Fair (DG) Known road density is fair.	**H** – Decommission roads at risk of landslide, especially side-cast roads. **H** – Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps et. **H** – Increase protection of steep and unstable slopes. **H** – Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **H** – Reduce livestock access to streams.		**H** - Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **M** – Conduct a landslide inventory. **M** – Update the surface erosion degradation database collected in the Wampler et al. 1993 report.
LWD	DG	**M** - Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H** – Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M** - Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor – Lower Good – Middle Fair – Upper (DG)	**H** - Revegetate open riparian areas with native plants including conifers in appropriate places. **M** - Interplant conifer into hardwood riparian areas that were historically conifer areas. **M**- Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H** - Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	DG	**M** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce livestock access to streams. **M** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **M** - Restore wetlands and off-channel habitat.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**M** – Water quality monitoring is needed (water temperature, dissolved oxygen, pH, turbidity).
Water Quantity	Good (DG) Good hydrologic maturity.	**M** - Reduce water withdrawals from surface source. **M** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **M** - Restore wetlands and off-channel habitat.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**L** – Install in-stream flow gage, and monitor stream flow.
Biological Processes	DG	**L** - Increase contribution of marine derived nutrients through increased use of carcasses.		**H** - Increase field surveys for salmonid escapement, distribution and habitat use by life history stage. **L** - Assess marine-derived nutrient processes.

Cloquallum Creek Subbasin

WAU Acreage	46,034.6
WAU's	Cloquallum
Major Tributaries	Rock and Wildcat Creeks
Major Land Uses	Agriculture, rural residential, forestry
Landownership	Private
Number and Type of Anadromous Fish Stocks	4: fall chinook, coho, winter steelhead, chum
Number of Anadromous Fish Habitat Miles	50.3 miles
Chehalis Watershed Subbasin Priority	Medium

Cloquallum River Subbasin

Cloquallum River Subbasin

CLOQUALLUM WAU

CLOQUALLUM CREEK

POWER CREEK

FALLS CREEK

BUSH CREEK

WILDCAT CREEK

WEST FORK WILDCAT CREEK

MIDDLE FORK WILDCAT CREEK

EAST FORK WILDCAT CREEK

108

8

CLOQUALLUM CREEK

12

CHEHALIS RIVER

N

3　　　　　　　　0　　　　　　　　3　Miles

Cloquallum River Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
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Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. Road density is high (4.5 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG). Known problems include rip-rap, channel incision, and roads.	**H -** Reconnect potential off-channel habitat. **H –** Reduce bank armoring. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, conserve, and prioritize off-channel and side-channel habitat and associated riparian. **H -** Develop and enforce Critical Areas Ordinances.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). Known problems are high road density, bank erosion, logging impacts, livestock access.	**H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **L -** Provide education regarding the impacts of vehicle activity in streams and increase enforcement. **M -** Provide education regarding the impacts of livestock. **H -** Reduce livestock access to Cloquallum River. **H -** Reduce roads and logging activities in sensitive areas near stream.	**H.** Allow forestlands to regenerate as per new forest practice regulations.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H -** Assess bank failures, bulkhead and channel confinement, and riparian conditions, and prioritize restoration actions accordingly.
LWD	DG. High peak flows, loss of riparian, channel incision.	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement. **H -** Allow forestlands to regenerate as per new forest practice regulations.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement). **H -** Assess to determine size, amount, and location or needed LWD.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas. **H -** Fence and revegetation where needed. **L –** Address human-caused bank erosion in a fish-friendly manner, where protection of private property is desired.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	DG (Known Poor in Wildcat). Warm water temps in Wildcat. Poor riparian throughout. Livestock access a problem.	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Reduce livestock access to Cloquallum River. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Restore wetlands and off-channel habitat. **H –** Reduce sediment inputs from roads. **H –** Reduce waste inputs (livestock and urban).	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H -** Monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor (DG). Poor hydrologic maturity and Wildcat Creek is a "closed" stream.	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	H - **INSTALL STREAM FLOW GAGE AND ASSESS SUMMER LOW FLOWS, DOCUMENTING HUMAN IMPACTS.**
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Delezene Creek Subbasin

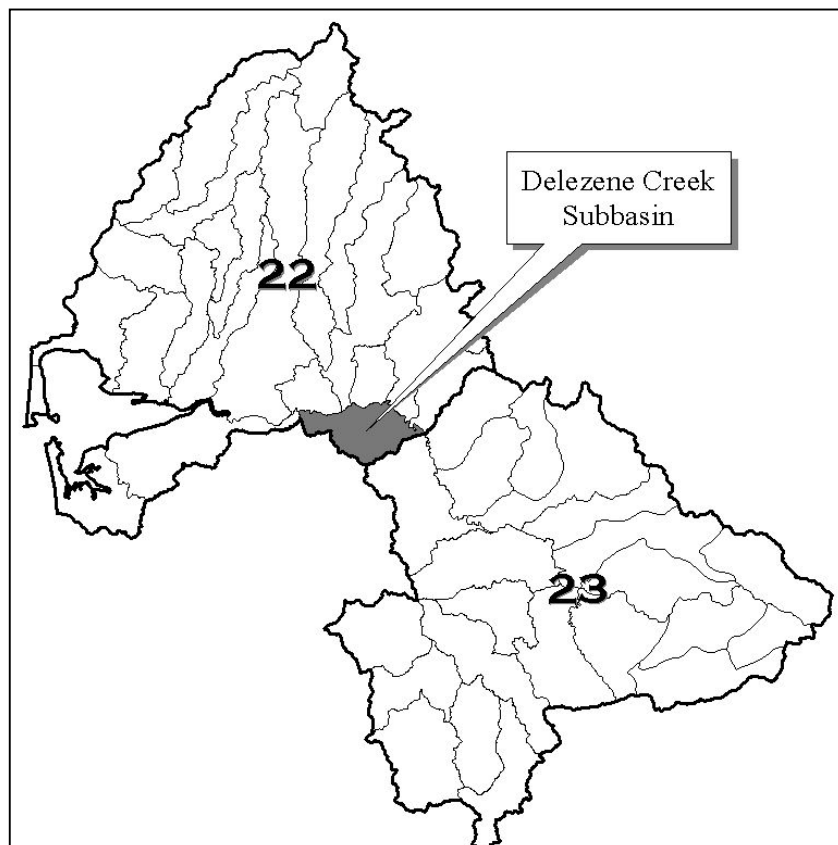|	
WAU Acreage	28,676.0
WAU's	Delezene
Major Tributaries	
Major Land Uses	Agriculture in lower areas, rural residential & forestry middle to upper areas
Landownership	Public and Private
Number and Type of Anadromous Fish Stocks	4: coho, winter steelhead, chum, and fall chinook
Number of Anadromous Fish Habitat Miles	8.1 miles
Chehalis Watershed Subbasin Priority	Medium

Delezene Creek Subbasin

STEVENS CREEK

CHEHALIS RIVER

FULLER CREEK

WORKMAN CREEK

ELIZABETH CREEK

DELEZENE
WAU

DELEZENE CREEK

EATON CREEK

CHEHALIS RIVER

N

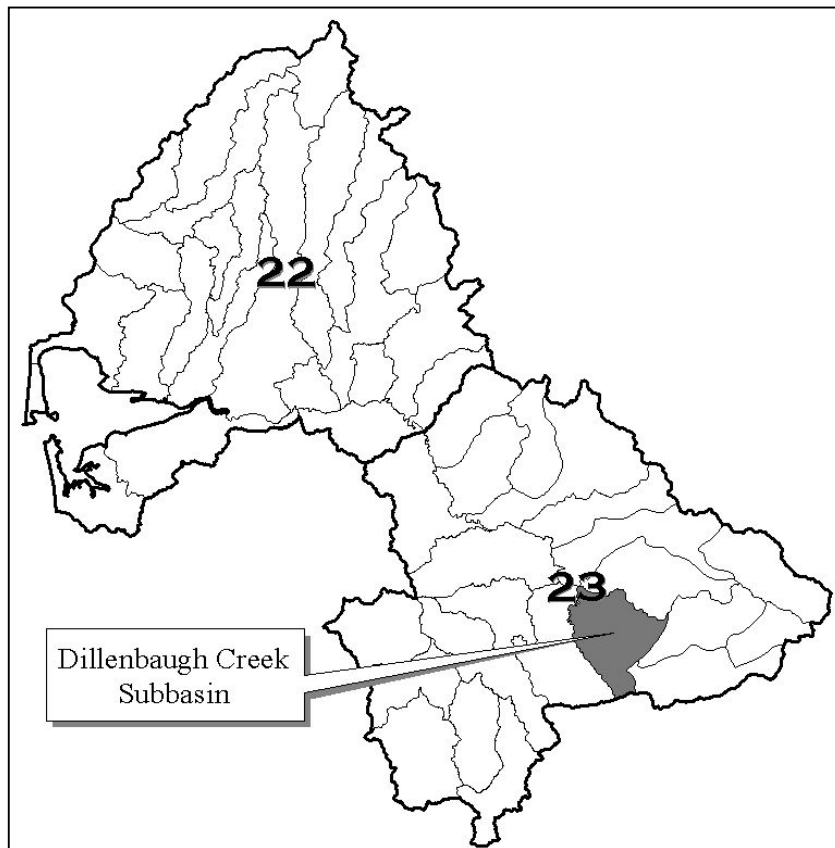3   0   3   Miles

Delezene Subbasin
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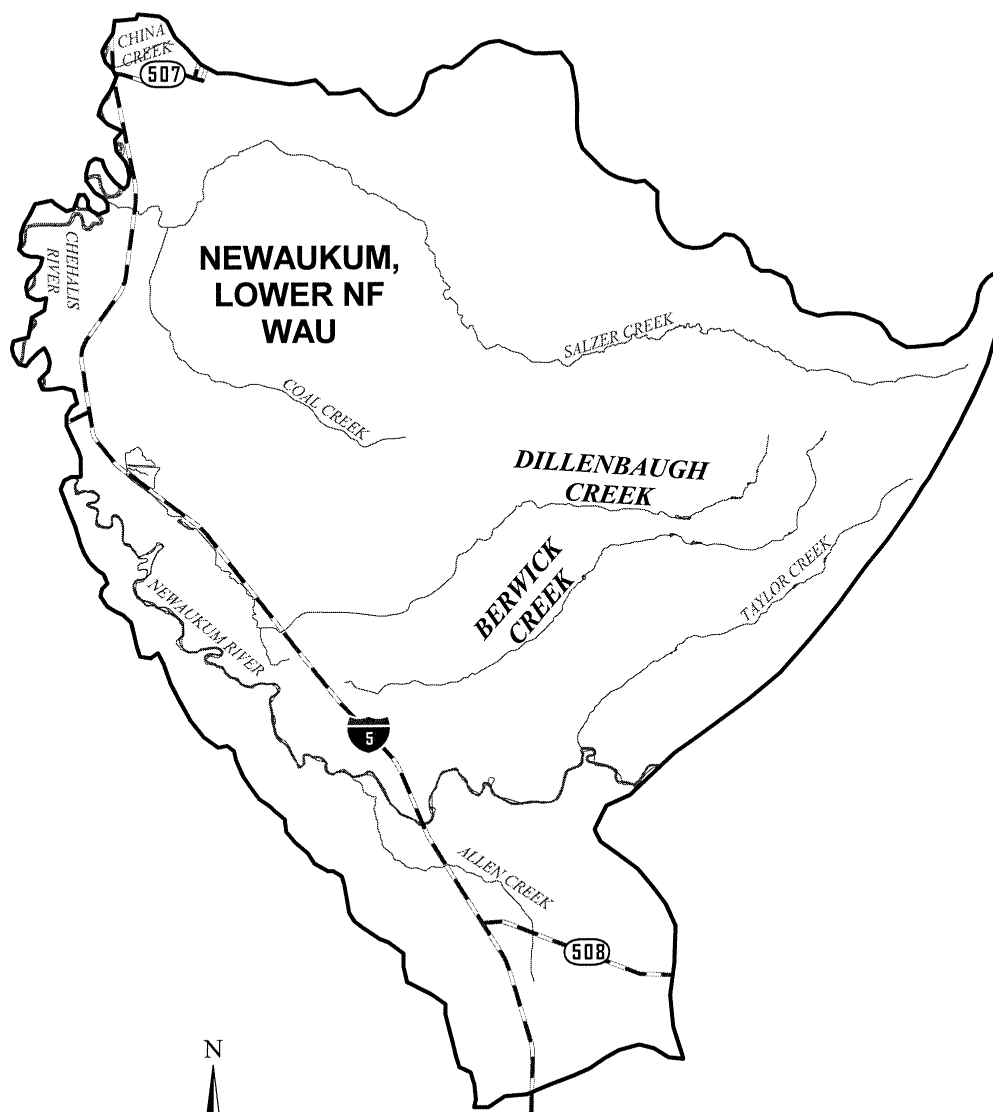| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. High road density (4.6 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data. **H -** Conduct a thorough watershed assessment.
Floodplain Conditions	Poor (DG). Past splash dams and current rip-rap.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian. **H -** Maintain recovering riparian zone	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory. **H -** Assess riparian and habitat conditions for spawning and rearing, and off-channel habitat. Determine current road density. **H -** Assess existing off-channel areas that are disconnected due to main channel incision.
Sediment	Poor (DG). High road density, high potential mass wasting and erosion area.	**H-** Decommission roads at risk of landslides. **H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **L -** Reduce livestock access to streams. **H -** Reduce roads and logging activities in sensitive areas near the stream.	**H -** Stay clear of sensitive areas in upper watershed. Reduce logging near stream.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H -** Assess mass wasting impacts and bank failures. Stream habitat assessment needed (banks, roads, LWD, riparian, etc.).
LWD	Poor (DG). Reduced due to splash dams and logging practices.	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration). **H -** If LWD is placed in-stream, use appropriate sized pieces with rootwads.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement). Needs assessment to determine size and location based on recovery time of watershed

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor (DG)	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas. **L -** Mostly timber land in upper area, which has been replanted and mending in most areas. Will be functional in about 40 years.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **M** - Maintain currently functioning riparian. Reduce logging, road building near sensitive areas. **H** – Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	DG. Poor riparian (lack of shade) suggests this might be a problem. Livestock access. Also sedimentation may have degraded water quality.	**H** - Actions need to address sediment, riparian, and flow problems. **L** - Reduce livestock access to streams. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat. **H** - Reduce sediment loads by addressing roads/logging in sensitive areas and in areas of potential mass wasting.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor (DG). Poor hydrologic maturity.	**M -** Encourage efforts to maintain and promote increased mature conifer land cover. **M** – Reduce water withdrawals from surface sources.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Install stream flow gage, and monitor stream flow.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Dillenbaugh Creek Subbasin

WAU Acreage	40,855.9
WAU's	Lower NF Newaukum
Major Tributaries	Berwick Creek
Major Land Uses	Urban & rural residential, agriculture
Landownership	Private
Number and Type of Anadromous Fish Stocks	1: coho
Number of Anadromous Fish Habitat Miles	7.78
Chehalis Watershed Subbasin Priority	Low

Dillenbaugh Creek
Subbasin

CHINA CREEK
507

CHEHALIS RIVER

NEWAUKUM, LOWER NF WAU

SALZER CREEK

COAL CREEK

DILLENBAUGH CREEK

BERWICK CREEK

TAYLOR CREEK

NEWAUKUM RIVER

5

ALLEN CREEK

508

N

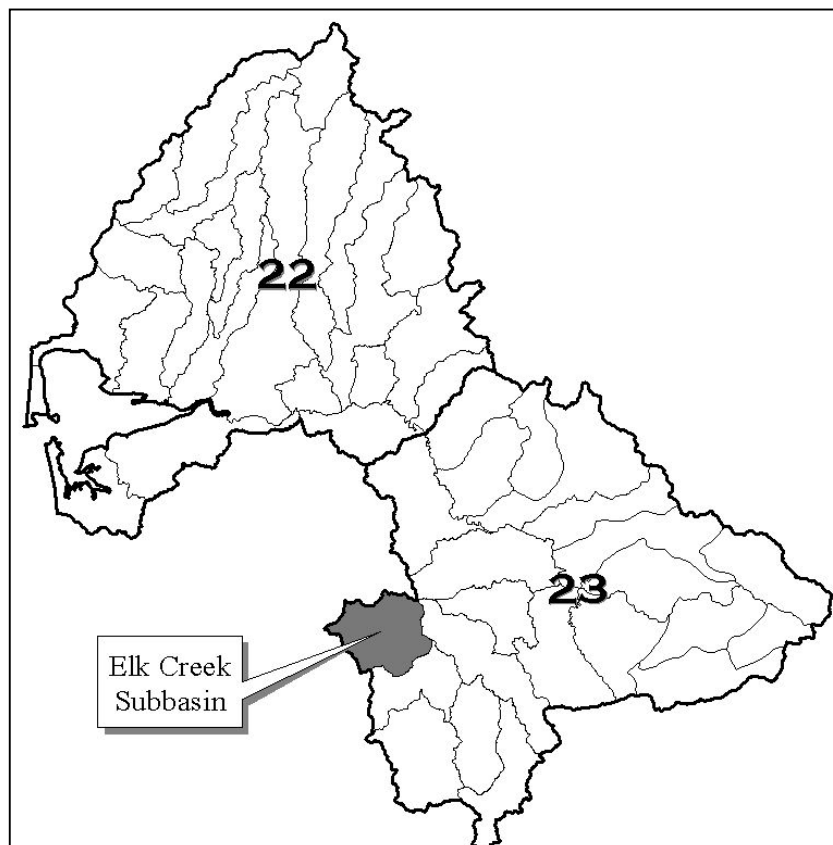2　　0　　2　Miles

Dillenbaugh Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

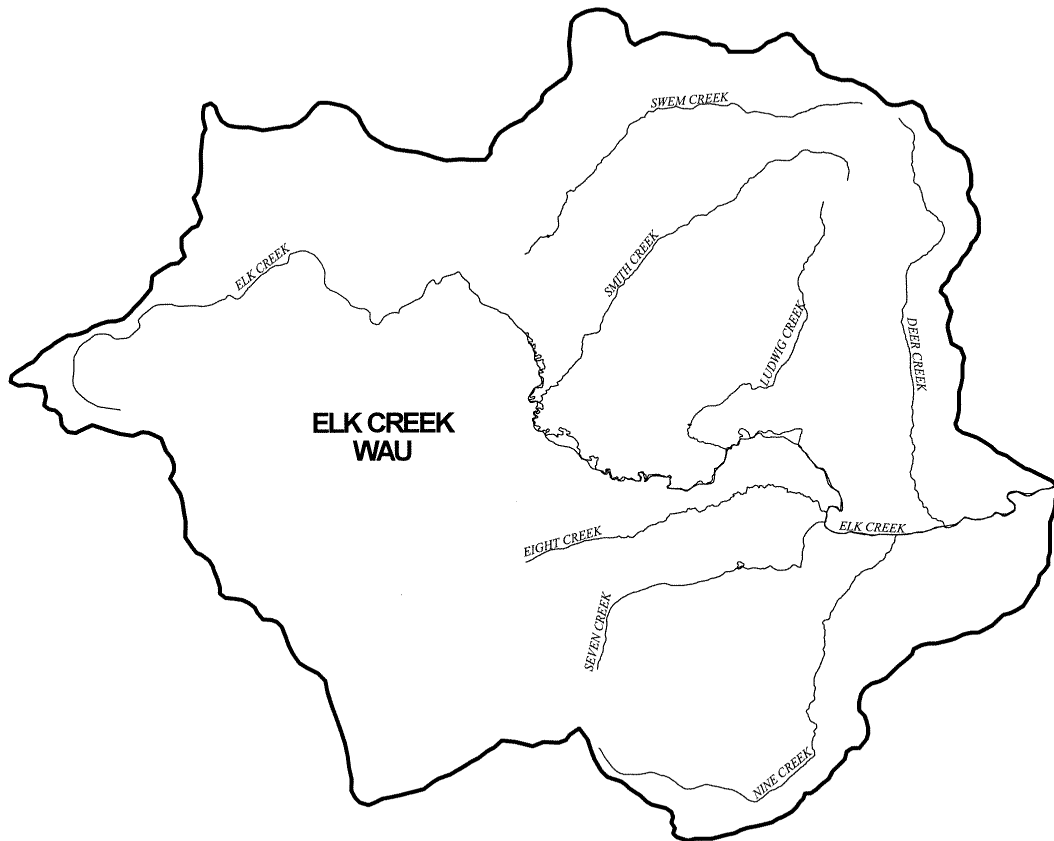| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M -** Develop a database housed with the lead entity, to contain all blockage data. **H -** Conduct salmonid surveys and a watershed assessment to determine the overall condition of the stream.
Floodplain Conditions	DG Unquantified reaches border I-5 and some is within city limits	**L -** Reconnect potential off-channel habitat. **L -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, prioritize, and conserve off-channel and side channel habitat and associated riparian.	**M -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	DG	**H -** Reduce livestock access to stream. **M -** Provide education regarding the impacts of vehicle activity in streams and increase enforcement. **M -** Provide education regarding the impacts of livestock access to streams.		**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **M -** Assess bank erosion (extent and causes) and prioritize sites for restoration.
LWD	DG	**L -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).
Riparian	DG	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**M -** Assess and prioritize recovery and protection for riparian conditions.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	Poor (DG). Buried chemicals, warm water temperatures, low dissolved oxygen. Causes: Industrial activity, waste wood landfill, stormwater, dairy farm waste, contaminated soils, dioxin & PCPs (superfund site).	**H** - Reduce livestock access and livestock waste inputs to streams. **H -** Develop and implement a stormwater plan that reduces impacts to salmonids. **L -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **L** - Restore wetlands and off-channel habitat.	**M -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Continue water quality monitoring.
Water Quantity	Poor. Low flows due to agriculture, impervious soils (urbanization), increased peak flows.	**H -** Reduce water withdrawals from surface sources. **M -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Elk Creek Subbasin

WAU Acreage	37,536.6
WAU's	Elk Creek
Major Tributaries	Eight, Seven, Nine, Ludwig, Swem, and Smith Creeks
Major Land Uses	Agriculture in lower reaches, forestry elsewhere
Landownership	Private
Number and Type of Anadromous Fish Stocks	4: spring chinook, fall chinook, coho, & winter steelhead
Number of Anadromous Fish Habitat Miles	33.73 miles
Chehalis Watershed Subbasin Priority	Medium

Elk Creek
Subbasin

SWEM CREEK

ELK CREEK

SMITH CREEK

LUDWIG CREEK

DEER CREEK

ELK CREEK
WAU

EIGHT CREEK

ELK CREEK

SEVEN CREEK

NINE CREEK

N

2   0   2 Miles

Elk Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. High road density and numerous culverts.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG) Channel incision, numerous logging roads. .	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, prioritize, and conserve off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG) High road density, side- cast roads, landslides in areas that are geologically sensitive and near stream, debris torrents, bank erosion.	**H -** Decommission roads at risk of landslides, especially side-cast roads. **H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **H -** Reduce livestock access to streams. **M -** Provide education regarding the impacts of livestock access to streams.	**H -** Enforce new forest practice regulations.	**H -** Inventory roads and landslides and assess impacts to salmonids and prioritize restoration actions accordingly.
LWD	Poor in lower (DG). Good (DG) in tributaries	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor in lower (DG)	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **H-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	DG. Tree canopy loss.	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Reduce livestock access to streams. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H -** Monitor water temperature, dissolved oxygen, pH, and turbidity. **H -** Assess culvert sizing.
Water Quantity	Poor (DG). Recent logging likely reduced hydrological maturity, concern about peak flows, water withdrawals.	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -** Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H -** Install stream flow gage and monitor stream flow. **H -** Assess actual water use and water rights. **H -** Update land cover data (hydrological maturity).
Biological Processes	DG, likely good.	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Elk River Subbasin

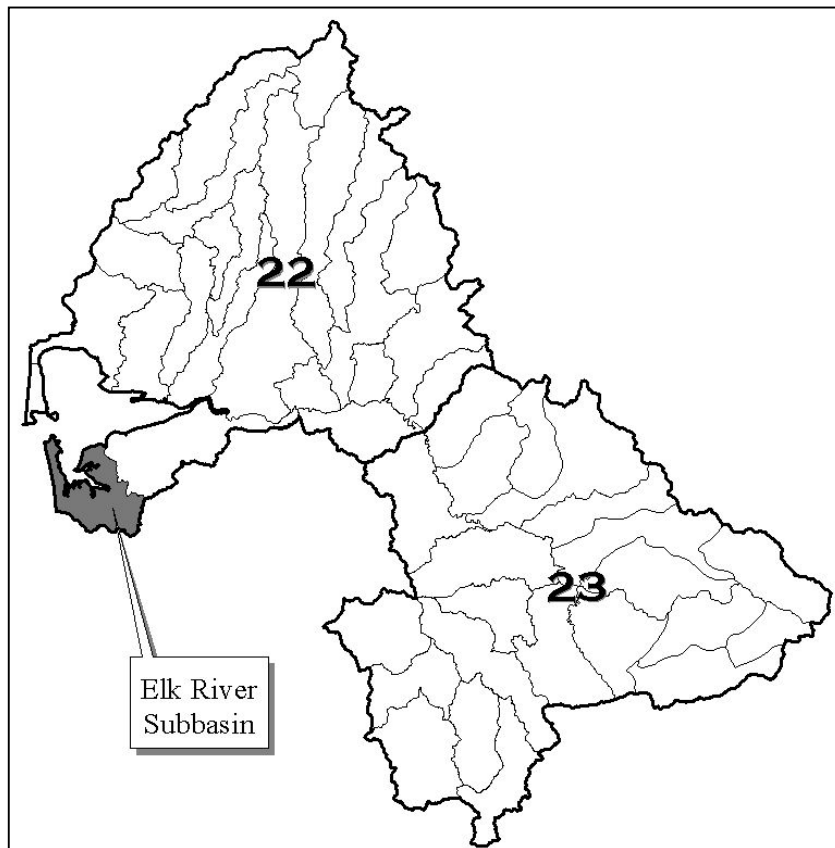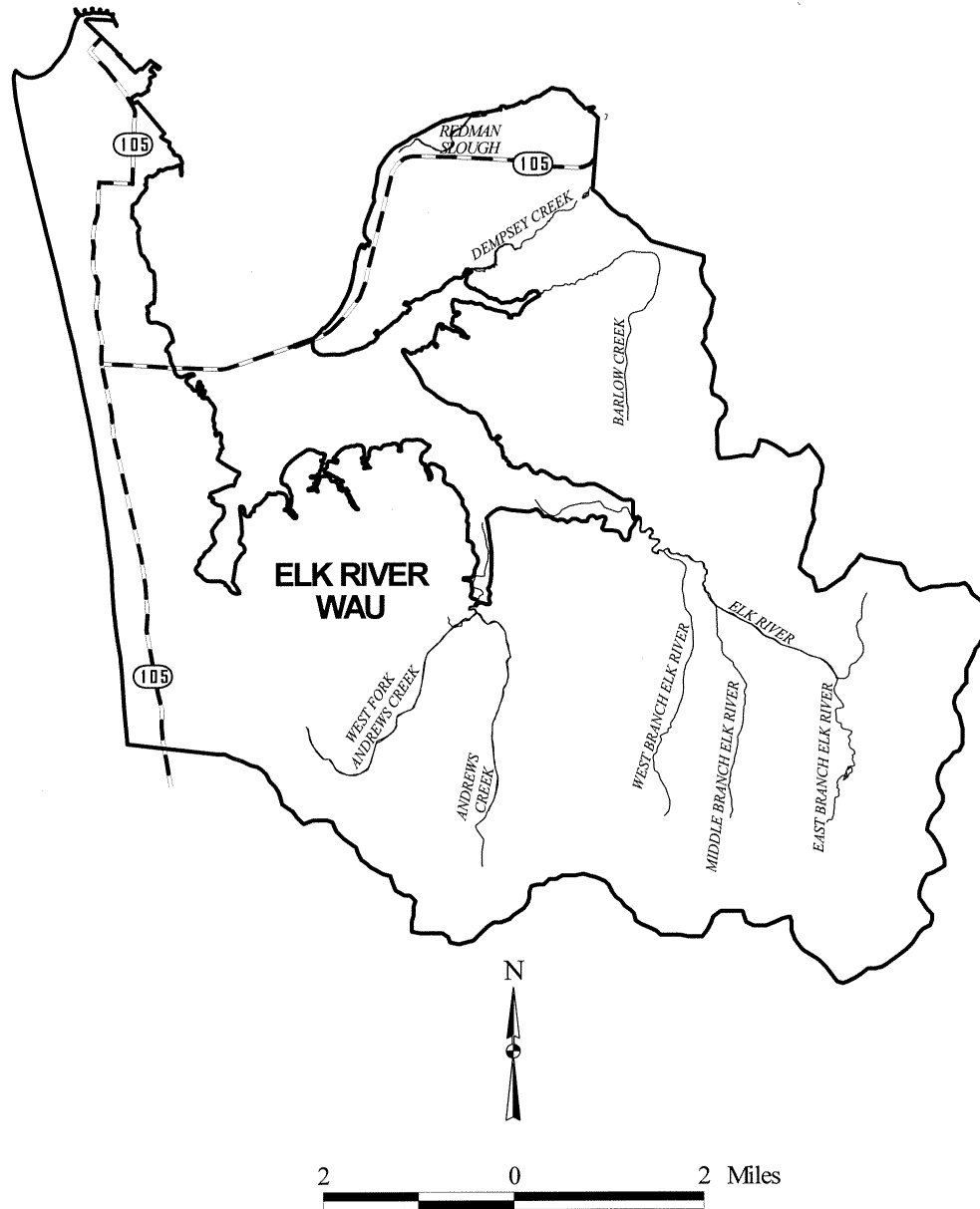|	
WAU Acreage	32,957.3
WAU's	Elk River
Major Tributaries	
Major Land Uses	Forestry, commercial shellfish
Landownership	Private
Number and Type of Anadromous Fish Stocks	4: fall chinook, coho, winter steelhead, chum
Number of Anadromous Fish Habitat Miles	11.31 miles
Chehalis Watershed Subbasin Priority	Medium

Elk River
Subbasin

REDMAN SLOUGH

105

105

DEMPSEY CREEK

BARLOW CREEK

ELK RIVER
WAU

105

ELK RIVER

WEST FORK ANDREWS CREEK

ANDREWS CREEK

WEST BRANCH ELK RIVER

MIDDLE BRANCH ELK RIVER

EAST BRANCH ELK RIVER

N

2   0   2 Miles

Elk River Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG, high road density	**H-** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H-** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M-** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M-** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Good (DG)	**L-** Reconnect potential off-channel habitat. **L-** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, prioritize, and conserve off-channel and side channel habitat and associated riparian.	**L-** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). High road density> 3 mi./sq. mi., high landslide potential.	**H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc.	**H -** Enforce forest practice regulations.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H -** Assess sediment delivery and source in upper reaches of Subbasin. Prioritize restoration actions.
LWD	DG	**L-** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**L-** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement)
Riparian	Good (DG)	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H-** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Good (DG).	**H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **L-** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**L –** Monitor water temperature, dissolved oxygen, pH, and turbidity. **L -** Clarify sources of fecal load.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quantity	Poor (DG)	**M -** Reduce water withdrawals from surface sources. **M -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **M -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Monitor stream flow.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Gaddis Creek Subbasin

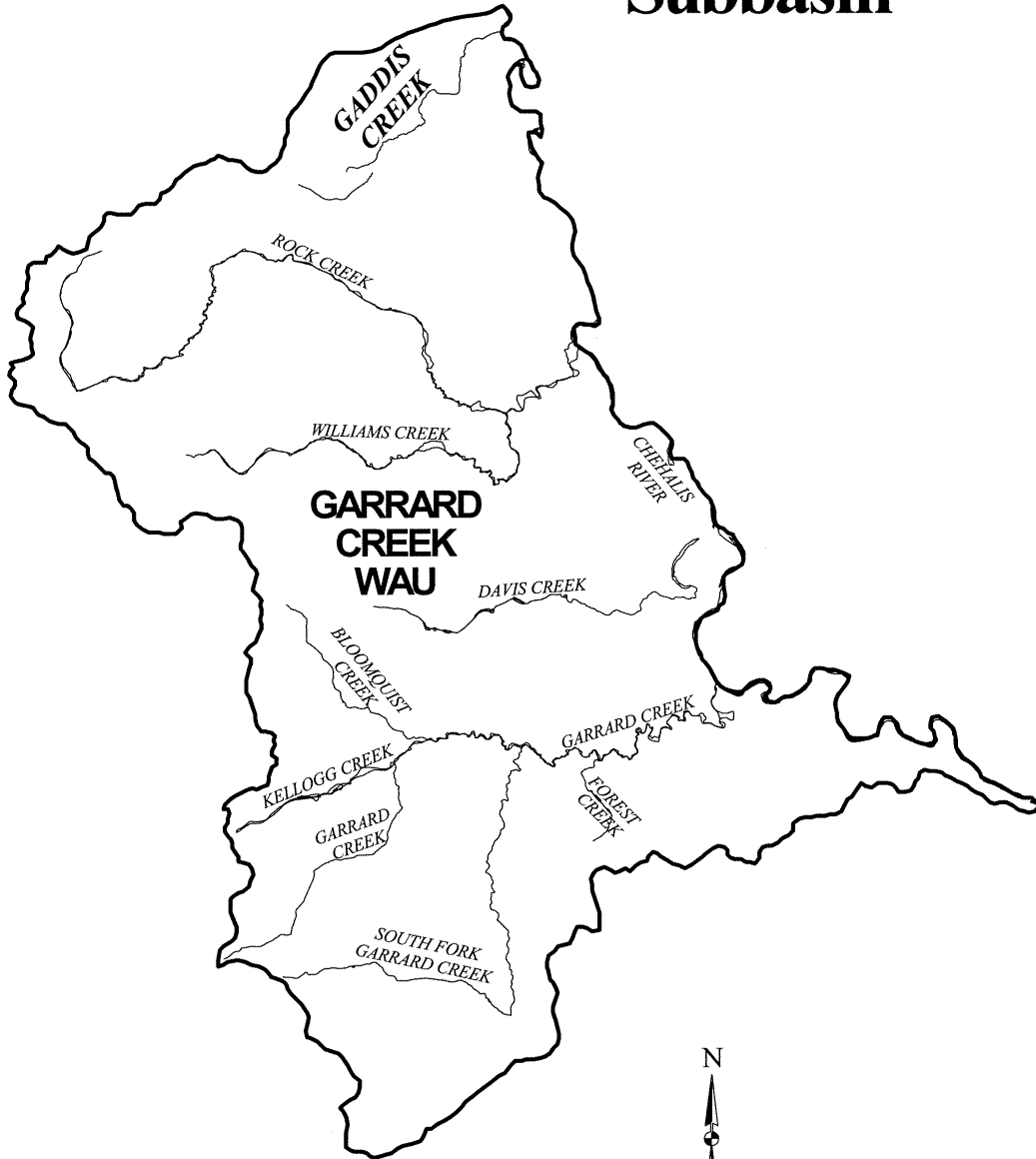|	
WAU Acreage	48,619.3
WAU's	Garrard Creek
Major Tributaries	Kellogg, S. Fork Garrard, & Bloomquist Creeks
Major Land Uses	
Landownership	
Number and Type of Anadromous Fish Stocks	2: coho, winter steelhead
Number of Anadromous Fish Habitat Miles	26.74 miles
Chehalis Watershed Subbasin Priority	Medium

Gaddis Creek Subbasin

GADDIS CREEK

ROCK CREEK

WILLIAMS CREEK

CHEHALIS RIVER

GARRARD CREEK WAU

DAVIS CREEK

BLOOMQUIST CREEK

GARRARD CREEK

KELLOGG CREEK

GARRARD CREEK

FOREST CREEK

SOUTH FORK GARRARD CREEK

N

3   0   3 Miles

Gaddis Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG Major culvert barrier complete in 2000, fair road density (2.7 mi/sq.mi)	**H** - Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks. **H** - Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages. **L** - Replace undersized culverts under county road (these are not barriers).		**M** - Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M** - Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG) Incised from logging activities.	**H** - Reconnect potential off-channel habitat. **H** - Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H** - Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H** - Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG) Fair road density, bank erosion, agricultural activity.	**H** - Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **M** - Reduce livestock access to streams. **L** - Provide education regarding the impacts of livestock.	**H** - Allow watershed to recover from logging	**H** - Inventory roads, bank erosion and causes, and livestock access, and assess impacts to salmonids and prioritize restoration actions accordingly.
LWD	DG	**M** - Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration). **H** - Revegetate conifer in upper areas.	**H** – Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M** - Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).
Riparian	Poor (DG), loss of canopy cover in upper area, lacks assessment	**H** - Revegetation open riparian areas with native plants including conifers in appropriate places. **M** - Interplant conifer into hardwood riparian areas that were historically conifer areas. **M**- Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H** - Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H** - Assess and prioritize recovery and protection for riparian conditions.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	DG, livestock access, agricultural practices, fair road density	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce livestock access to streams. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H -** Assessment to determine road impacts, livestock impacts and local farming practices.
Water Quantity	Poor (DG). Low summer flows, surging winter flows, scour.	H - **REDUCE WATER WITHDRAWALS FROM SURFACE SOURCES.** **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. H Allow riparian areas to recover, Enforce new forest practices	
Biological Processes	DG (likely poor due to blocking culvert that was recently removed).	**H** - Nutrient enhancement is needed in the upper watershed due to past blocking culvert.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Garrard Creek Subbasin

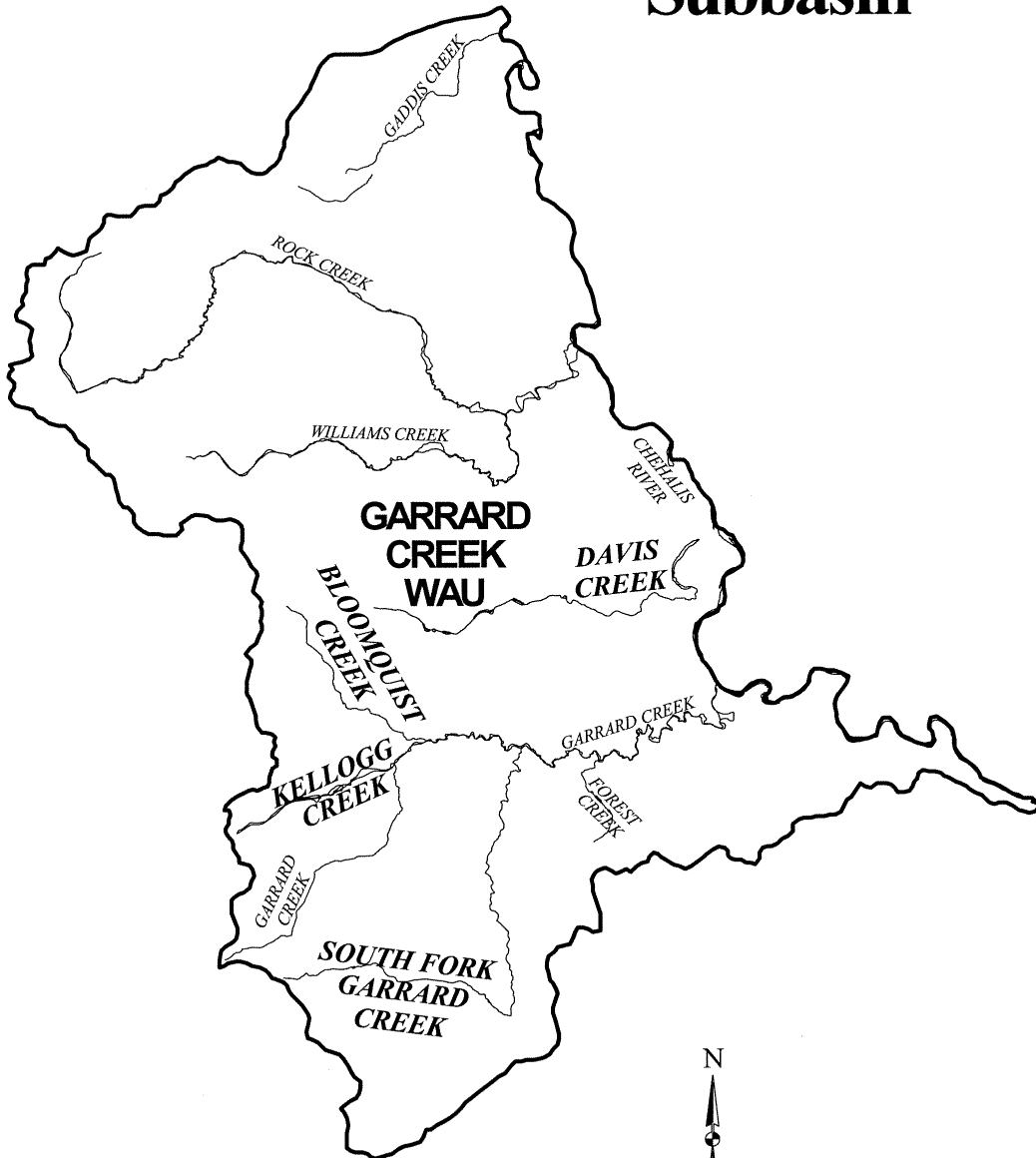|	
WAU Acreage	48,619.3
WAU's	Garrard Creek
Major Tributaries	Kellogg, S. Fork Garrard, & Bloomquist Creeks
Major Land Uses	
Landownership	
Number and Type of Anadromous Fish Stocks	2: coho, winter steelhead
Number of Anadromous Fish Habitat Miles	26.74 miles
Chehalis Watershed Subbasin Priority	Medium

Garrard Creek Subbasin

Garrard Creek Subbasin

GADDIS CREEK

ROCK CREEK

WILLIAMS CREEK

CHEHALIS RIVER

GARRARD CREEK WAU

DAVIS CREEK

BLOOMQUIST CREEK

GARRARD CREEK

KELLOGG CREEK

FOREST CREEK

GARRARD CREEK

SOUTH FORK GARRARD CREEK
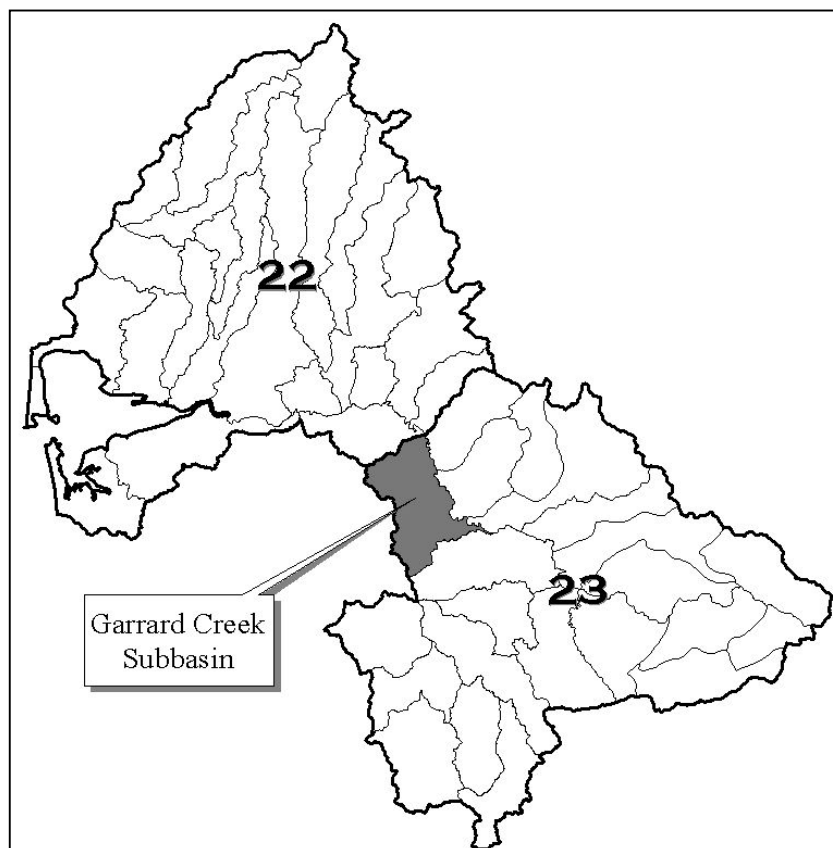
N

3   0   3 Miles
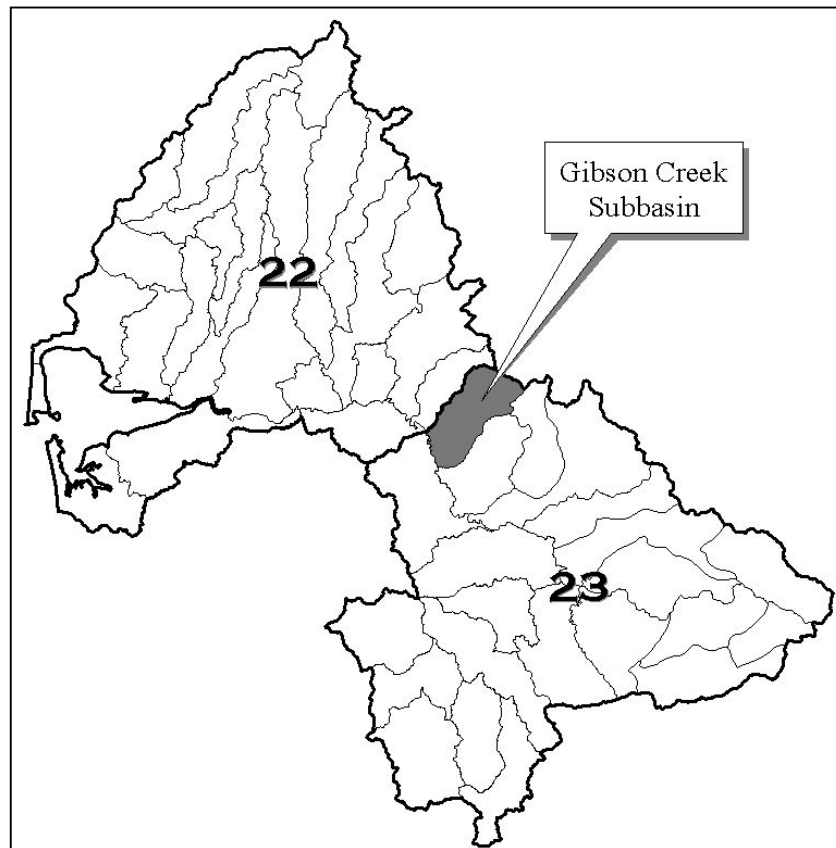
Garrard Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
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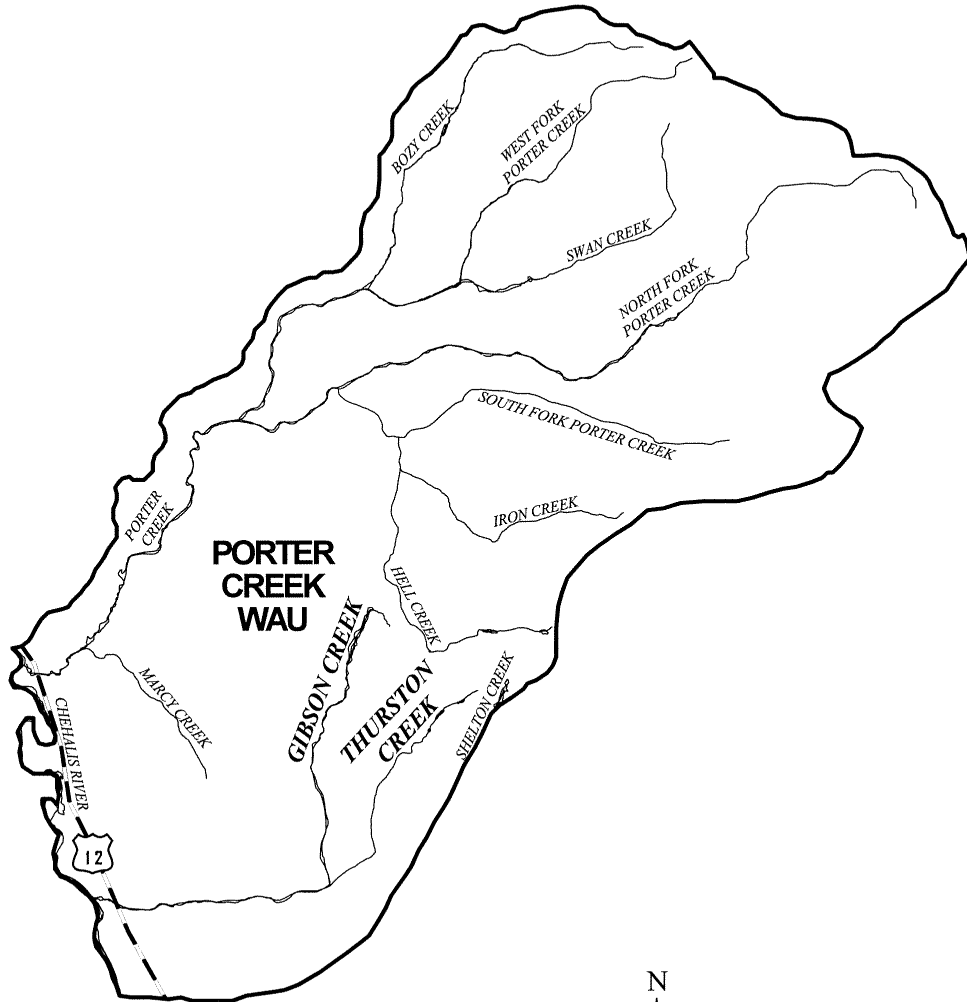| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG, fair road density (2.7 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	DG, Rip-rap throughout basin.	**H -** Reconnect potential off-channel habitat. **H –** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H -** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). Bank erosion, livestock access, fair road density.	**M –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H –** Reduce livestock access to streams. **M –** Provide education regarding the impacts of livestock.		**H -** Inventory roads, bank erosion and causes, and livestock access, and assess impacts to salmonids and prioritize restoration actions accordingly.
LWD	DG	**M –** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD or increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement). **H -** Assess stream channel stability and LWD.
Riparian	Poor (DG), 25% of forest area converted to non-forest use.	**H –** Revegetate open riparian areas with native plants including conifers in appropriate places. **M –** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H -** Assess and prioritize recovery and protection for riparian conditions.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	DG. Livestock access, livestock input.	**H** – Actions need to address sediment, riparian, and flow problems. **H** – Reduce livestock access to streams. **H** – Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** – Restore wetlands and off-channel habitat.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Monitor water temperatures, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor. Low summer flows, water withdrawals, forestlands converted to other use, high peak flows, and scour.	**H** – Reduce water withdrawals from surface sources. **H** – Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H** –Restore wetlands and off-channel habitat.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Install a stream flow gage and monitor flow.
Biological Processes	DG	**L** – Increase contribution of marine –derived nutrients through increased use of carcasses.		**H** - Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L** - Assess marine-derived nutrient processes.

Gibson Creek Subbasin

WAU Acreage	32,900.4
WAU's	Porter Creek
Major Tributaries	Thurston Creek
Major Land Uses	Rural residential, forestry
Landownership	Public and private
Number and Type of Anadromous Fish Stocks	1: coho
Number of Anadromous Fish Habitat Miles	2.06 miles
Chehalis Watershed Subbasin Priority	Low

Gibson Creek
Subbasin

BOZY CREEK

WEST FORK PORTER CREEK

SWAN CREEK

NORTH FORK PORTER CREEK

SOUTH FORK PORTER CREEK

IRON CREEK

PORTER CREEK

PORTER CREEK WAU

HELL CREEK

GIBSON CREEK

THURSTON CREEK

SHELTON CREEK

MARCY CREEK

CHEHALIS RIVER

12

N

2   0   2 Miles

Gibson Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. Fair road density (2.9 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	DG	**M -** Reconnect potential off-channel habitat. **M -** Restoration actions need to increase instream.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**L -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment: Spawning gravel quantity	Fair (DG). Fair road density, medium level of bank erosion. Livestock access in lower reaches.	**M-** Decommission roads at risk of landslides. **H -** Correct road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **M -** Increase protection of steep and unstable slopes. **L -** Reduce livestock access to streams. **L -** Provide education regarding the impacts livestock.		**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly.
LWD	DG	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement). **H –** Survey streams to classify habitat (banks, LWD, riparian, etc.).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	DG Poor – Lower. Fair – Upper.	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas. **L** - Exclude livestock access and replant riparian areas damaged by livestock.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H** – Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	DG. Poor to fair riparian, some livestock access.	**M** - Actions need to address sediment, riparian, and flow problems. **L** - Reduce livestock access to streams. **M** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **M** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**M** - Monitor water quality such as water temperatures, dissolved oxygen, pH, and turbidity.
Water Quantity	Good (DG). Good hydrological maturity	**L** - Reduce water withdrawals from surface sources. **L** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **M -** Restore wetlands and off-channel habitat.	**M -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **L** - Preserve hydrologic maturity, i.e., mid and late seral conifer forest.	**L** - Install a stream flow gage and monitor stream flows.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, escapements, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Grays Harbor Estuary

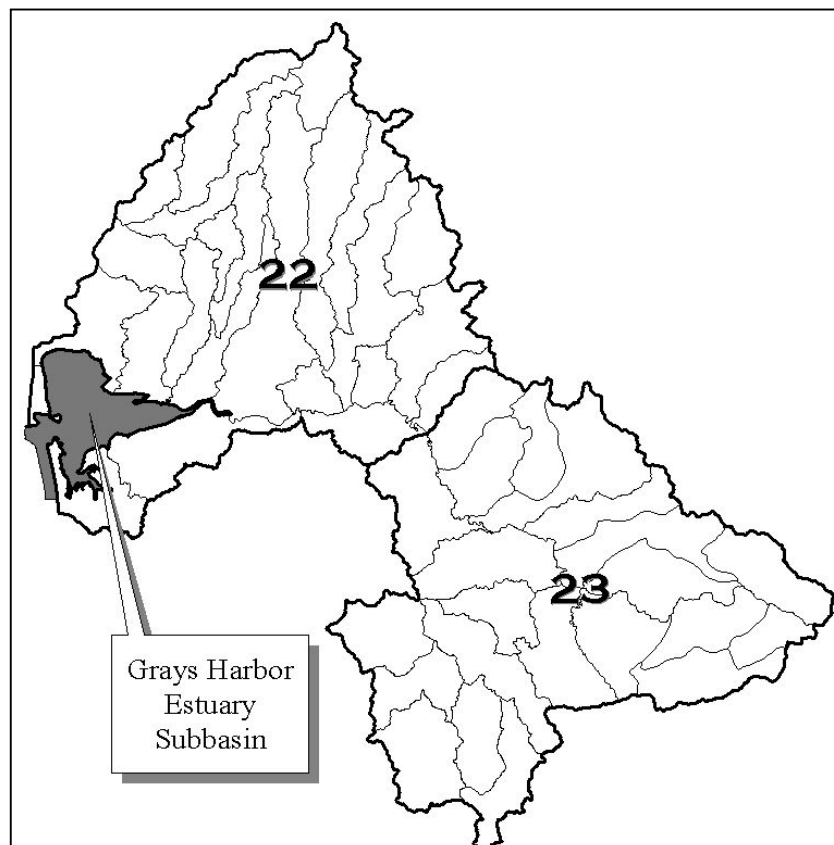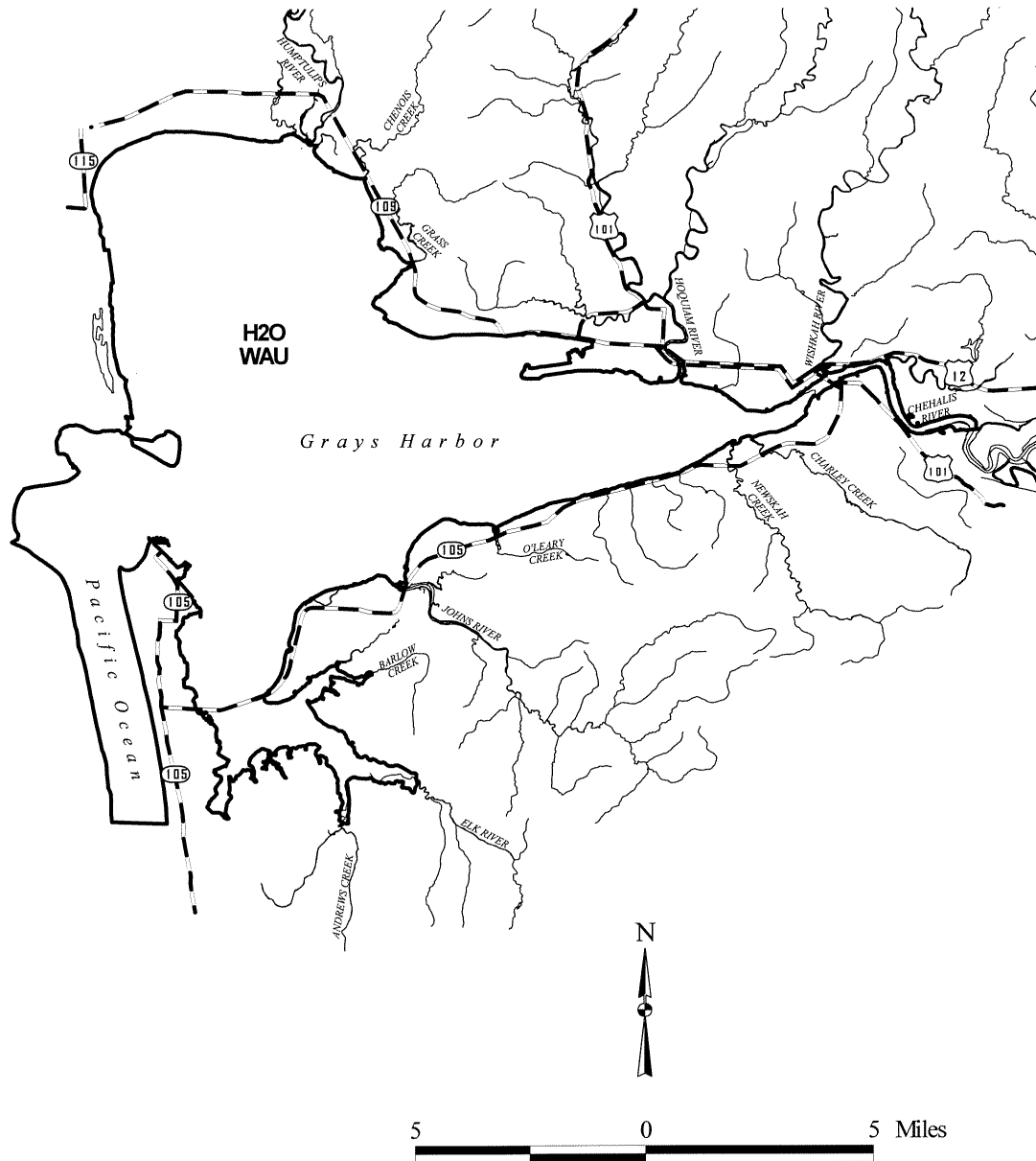|	
WAU Acreage	90 square miles
WAU's	
Major Tributaries	Chehalis, Humptulips, Hoquiam, Johns, & Elk rivers
Major Land Uses	Urban, rural residential, forestry
Landownership Patters	Private
Number and Type of Anadromous Fish Stocks	7: summer chinook, fall chinook, spring chinook, coho, winter steelhead, summer steelhead, chum, and cutthroat
Number of Anadromous Fish Habitat Miles	NA
Chehalis Watershed Subbasin Priority	High

Grays Harbor
Estuary
Subbasin

Grays Harbor Estuary Subbasin

H2O
WAU

Grays Harbor

Pacific Ocean

HUMPTULIPS RIVER
CHENOIS CREEK
GRASS CREEK
HOQUIAM RIVER
WISHKAH RIVER
CHEHALIS RIVER
CHARLEY CREEK
NEWSKAH CREEK
O'LEARY CREEK
JOHNS RIVER
BARLOW CREEK
ELK RIVER
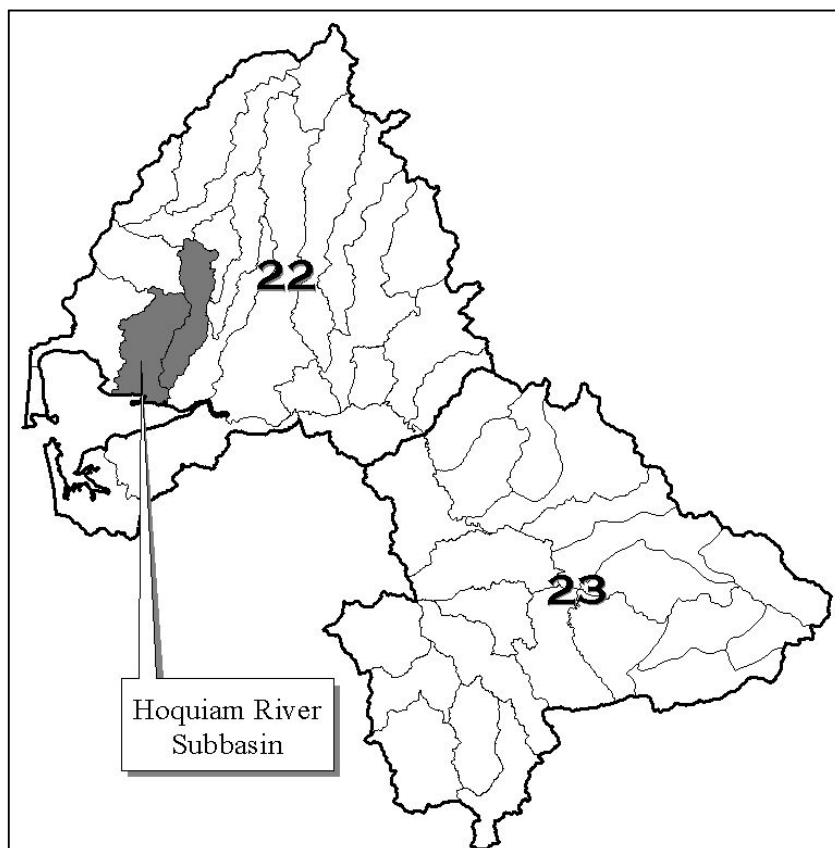ANDREWS CREEK

N

5   0   5 Miles

Grays Harbor Estuary
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.
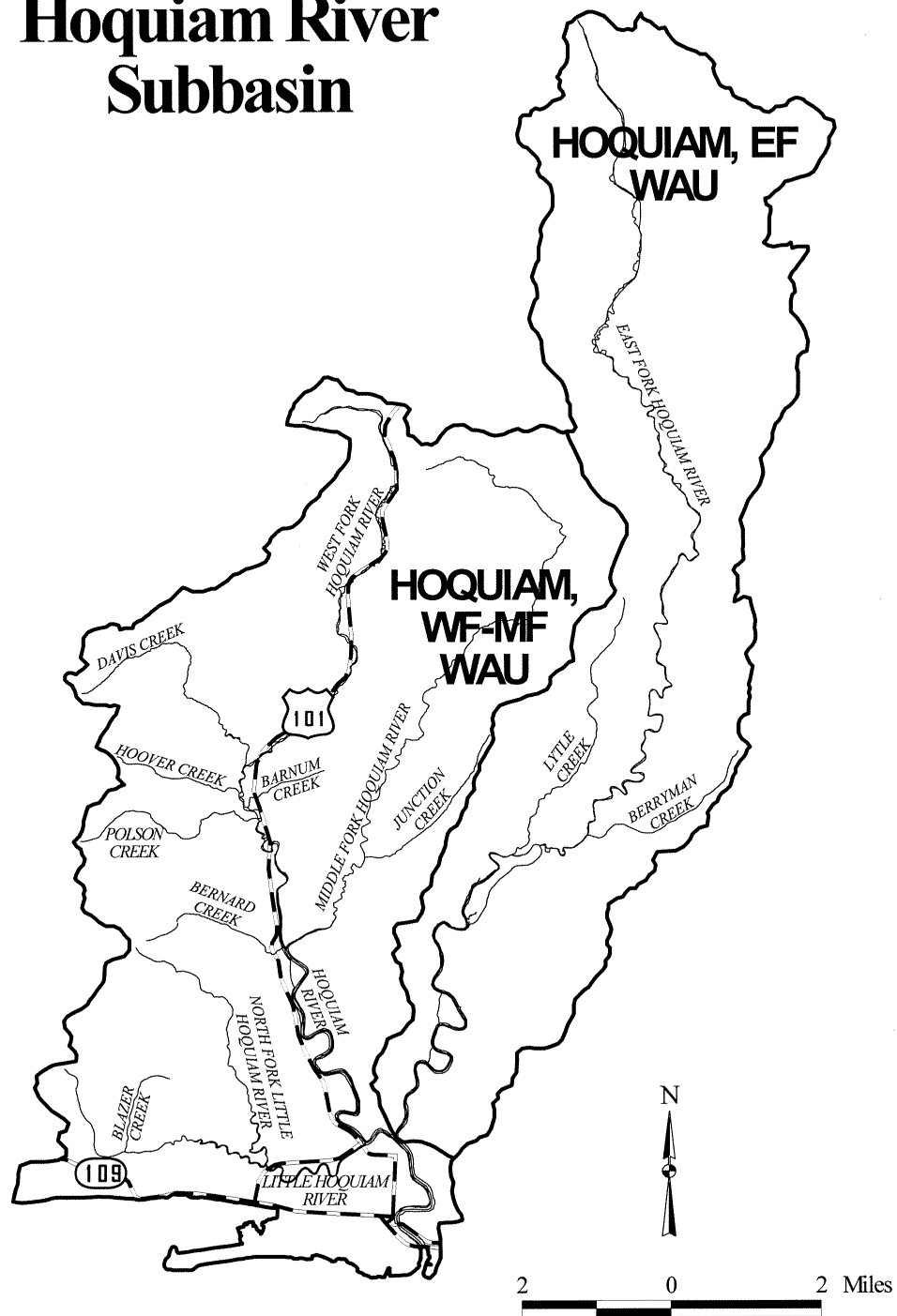
Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Estuary	Medium level of documented loss compared to Puget Sound.	**H** - Minimize the impacts of dredging on salmonid survival. **M** - Continue the Spartina eradication program in Grays Harbor.		
Floodplain Conditions		**H** - Reduce bank armoring along the lower reaches of rivers and in the estuaries, especially in the lower Wishkah and Hoquiam Rivers and along Johns River estuary. **H** - Reconnect the potential off-channel habitat in the lower Chehalis River as described in Ralph et al. 1994.	**H** - Protect the intact estuarine floodplain habitat in the lower Chehalis River (RM 13-20). **H** - Protect the Humptulips estuary and lower river from development within the floodplain.	**H** – Inventory and prioritize the estuarine shoreline, identifying good areas for preservation and areas for restoration.
Water Quality	Poor. Recent improvements but need to show link to salmonid survival.	**H** – Continue to enforce and monitor pollution discharge from mill effluent, following DOE's pollution discharge permit. **H** - Follow the recommendations of the future TMDL for dioxin.		**H** - Assess smolt survival in the inner harbor and compare to Humptulips smolt survival to see if water quality improvements have been successful in improving Chehalis coho smolt survival. **M** - Monitor eelgrass habitat in Grays Harbor to determine trends and salmonid use.
LWD		**L -** Introduce LWD in the estuary between the Wishkah and Hoquiam Rivers and in the lower tidal zone of rivers.	**H** – Prevent removal of appropriate pieces of LWD through increased education and enforcement.	
Nearshore		**H** - Discourage the development of seawalls along the coastline		

Hoquiam River Subbasin

WAU Acreage	59,601.7
WAU's	EF and WF-MF Hoquiam
Major Tributaries	East, West, and Middle Forks of the Hoquiam River, & Little Hoquiam
Major Land Uses	Forestry, urban (Hoquiam)
Landownership	Private with 12% public (Hoquiam)
Number and Type of Anadromous Fish Stocks	4: fall chinook, coho, winter steelhead, chum
Number of Anadromous Fish Habitat Miles	78.79 miles
Chehalis Watershed Subbasin Priority	High

Hoquiam River Subbasin

Hoquiam River Subbasin

HOQUIAM, EF WAU

EAST FORK HOQUIAM RIVER

WEST FORK HOQUIAM RIVER

HOQUIAM, WF-MF WAU

DAVIS CREEK

HOOVER CREEK

BARNUM CREEK

101

MIDDLE FORK HOQUIAM RIVER

JUNCTION CREEK

LITTLE CREEK

BERRYMAN CREEK

POLSON CREEK

BERNARD CREEK

HOQUIAM RIVER

NORTH FORK LITTLE HOQUIAM RIVER

BLAZER CREEK

109

LITTLE HOQUIAM RIVER

N

2   0   2 Miles

Hoquiam River Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG Poor road density (3.6 miles/square mile)	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species throughout all life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dams, dikes, railroad grades, etc.). Passage structures should be designed to allow passage for all fish species throughout all life history stages. **H** - Develop a database housed with the lead entity, to contain all blockage data. **H** – Assess fish passage at dam.
Floodplain Conditions	Poor in lower (developed); fair to good in upper (DG).	**H** - Reconnect potential off-channel habitat. **H** - Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H -** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG) except in EF where it is rated fair. High road density.	**H**- Decommission roads at risk of landslides, especially side-cast roads. **H** - Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H** - Increase protection of steep and unstable slopes. **H** - Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **L** – Reduce livestock access. **H** – Address the issues of coarse sediment blockage by dam and ramping rates for minimal sediment input.		**H -** Inventory roads and assess impacts to salmonids as well as prioritize restoration actions.
LWD	DG	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H** – Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M** - Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor in lower reaches and in EF; fair-good elsewhere. Lower reaches impacted by development.	**H -** Revegetate open riparian areas with native plants including conifers in historical/appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer/hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Fair (DG)	**M** - Actions need to address sediment, riparian, and flow problems. **L** - Reduce livestock access to streams. **M** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **M** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**M -** Conduct water quality assessment to determine specific sources attributing to water quality issues, and identify activities to correct water quality. **M** - Monitor water temperature, dissolved oxygen, pH, and turbidity in each major fork of the Hoquiam River.
Water Quantity	Poor (DG) based on hydrologic maturity.	**H -** Reduce water withdrawals from surface sources **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Install a stream flow gage and monitor stream flow.
Biological Processes		**L-** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Humptulips River Subbasin

WAU Acreage	178,066.2
WAU's	EF, Middle, and WF Humptulips; Stevens Creek, Tulips, & Ocean Shores Coastal
Major Tributaries	East, Middle, and West Forks of the Humptulips River, Big Creek, & Stevens Creek
Major Land Uses	Mostly forestry; floodplain areas are agriculture
Landownership	Most is private, upper 2/3 of E. and W. Forks public (USFS)
Number and Type of Anadromous Fish Stocks	5: fall chinook, coho, winter steelhead, summer steelhead, chum, and cutthroat
Number of Anadromous Fish Habitat Miles	186.68 miles
Chehalis Watershed Subbasin Priority	High
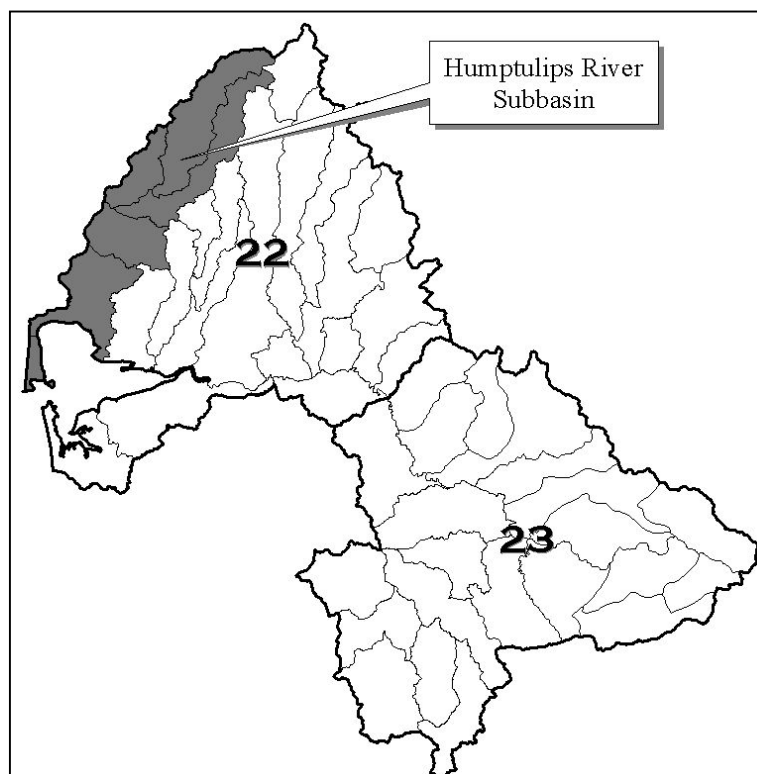
Humptulips River Subbasin

HUMPTULIPS, WF
WAU

STEVENS
CREEK
WAU

HUMPTULIPS, EF
WAU

HUMPTULIPS,
MIDDLE
WAU

TULIPS
WAU

OCEAN
SHORES
COASTAL
WAU

WEST FORK
HUMPTULIPS RIVER

CHESTER CREEK

PHILLIPS CREEK

GROUSE CREEK   ELK CREEK

GODFREY CREEK

FLATBOTTOM
CREEK

NEWBURY
CREEK

RAINBOW CREEK

DONKEY CREEK

EAST FORK
HUMPTULIPS RIVER

STEVENS CREEK

O'BRIEN
CREEK

HEMATITE
CREEK

WIDOW
CREEK

ROCK
CREEK

JONES
CREEK

WEST FORK
STEVENS CREEK

FURLOUGH
CREEK

WEBFOOT
CREEK

HATCHERY
CREEK

BRITTAIN CREEK

HANSEN CREEK

FAIRCHILD CREEK

HUMPTULIPS RIVER

MADRONA CREEK

101

KNIFE LINE

SOUTH BRANCH
BIG CREEK

CEDAR CREEK

DAMON
CREEK

NELSON
CREEK

RED CREEK

STEAM CREEK

HUMPTULIPS
RIVER

BURG
SLOUGH

CHENOIS CREEK

CAMPBELL
SLOUGH

BONE
SLOUGH

109

COLE
CREEK

GRASS
CREEK

N

6   0   6 Miles

Humptulips River Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. Known problems: Fair road density (2.8 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor in WF & EF; Good in mainstem. Known problems: incision, limited off-channel habitat.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, conserve and prioritize off-channel and side channel habitat and associated riparian.	**M -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). Known problems: landslides caused by roads, bank erosion in lower reaches.	**H -** Improve road drainage at areas identified in watershed analysis. **H -** Decommission road segments that are at high risk of causing landslides (watershed analysis). **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **H –** Relocate gravel extraction activities away from shorelines and the 100-year floodplain. **H -** Reduce livestock access to streams, especially to the mainstem Humptulips River and Deep Creek.		**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **M -** Identify sites, extent, and restoration actions for bank erosion downstream of the forks.
Current Instream LWD	Good in mainstem; Poor in tributaries.	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places in the tributaries. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement)

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor except in upper EF and upper WF. Known problems: riparian loss and conversion to hardwoods.	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer and hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions in the reaches downstream of the EF and WF confluence.
Water Quality	Poor. Known problems: warm water temperatures (likely due to poor riparian conditions).	**H -** Actions need to address sediment and riparian problems. **H -** Reduce livestock access to streams, especially to the mainstem Humptulips River and Deep Creek. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Good in most areas. Concern about peak flows.	**M -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**M -** Reinstate the flow monitoring gage in the Humptulips River and monitor stream flows.
Biological Processes	Poor	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Independence Creek Subbasin

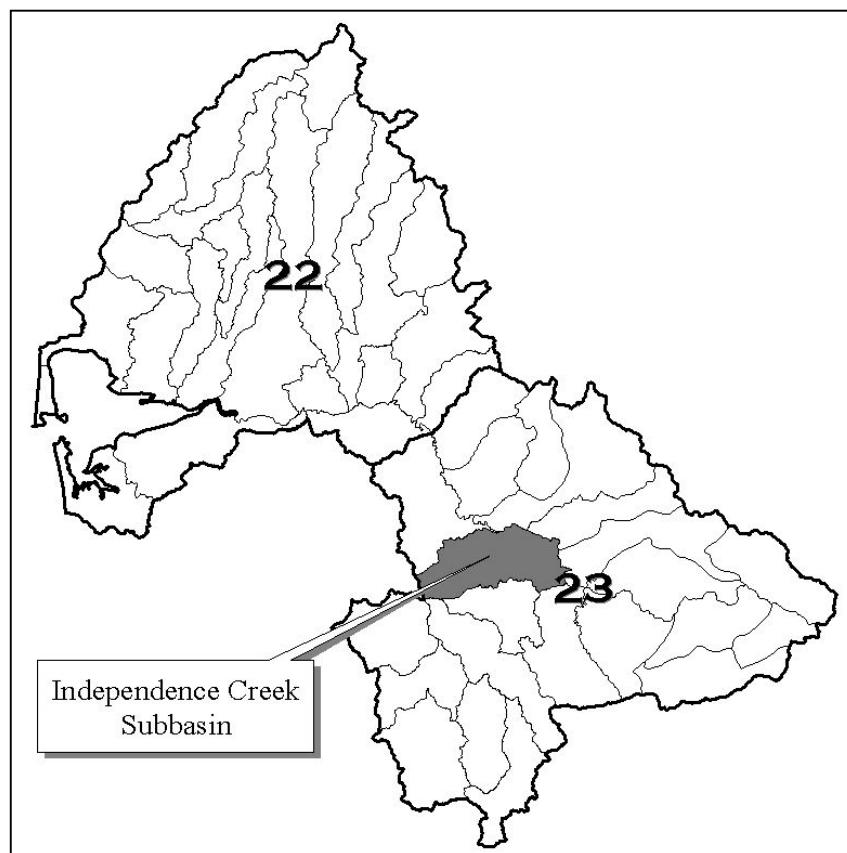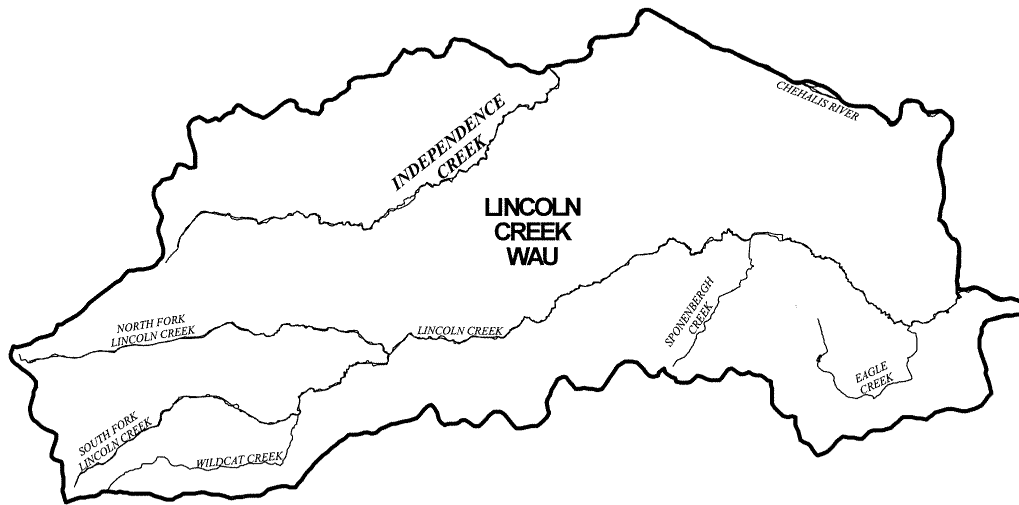|	
WAU Acreage	48,245.0
WAU's	Lincoln Creek
Major Tributaries	
Major Land Uses	Forestry, agriculture, and rural residential
Landownership	Public and private
Number and Type of Anadromous Fish Stocks	1: coho
Number of Anadromous Fish Habitat Miles	11.03 miles
Chehalis Watershed Subbasin Priority	Low

Independence Creek Subbasin

Independence Creek
Subbasin

CHEHALIS RIVER

INDEPENDENCE CREEK

LINCOLN CREEK WAU

NORTH FORK LINCOLN CREEK

LINCOLN CREEK

SPONENBERGH CREEK

EAGLE CREEK

SOUTH FORK LINCOLN CREEK

WILDCAT CREEK

N

| 4 | 0 | 4 Miles |

Independence Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. Suspect Poor. Numerous blockages and high road density (3.4 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	DG Rip-rap, roads in floodplain.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H -** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory. **H -** Assess level of rip-rap and other bank protection and estimate impact.
Sediment	Poor (DG) Bank erosion, debris torrents, siltation of spawning gravel, livestock access.	**H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **M -** Reduce livestock access to streams. **M -** Provide education regarding the impacts of livestock.		**H -** Inventory roads and assess impacts to salmon and steelhead as well as prioritize restoration actions.
LWD	DG	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).
Riparian	Poor (DG)	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H -** Assess and prioritize recovery and protection for riparian conditions.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	Poor. Low dissolved oxygen, livestock access and waste inputs.	**H** - Actions need to address sediment, riparian, and flow problems. **M** - Reduce livestock access to streams. **H** - Implement the TMDL for water temperature. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Assess current level of livestock impacts and waste inputs.
Water Quantity	Poor (DG) Low summer flows, water withdrawals, increased peak flows due to riparian impacts, poor hydrological maturity.	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Install a stream flow gage and monitor stream flow. **H** - Assess actual water usage and compare to water rights.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H** - Increase field surveys for salmonid escapement, distribution, and habitat use (life history stage). **L-** Assess marine-derived nutrient processes.

Johns River Subbasin

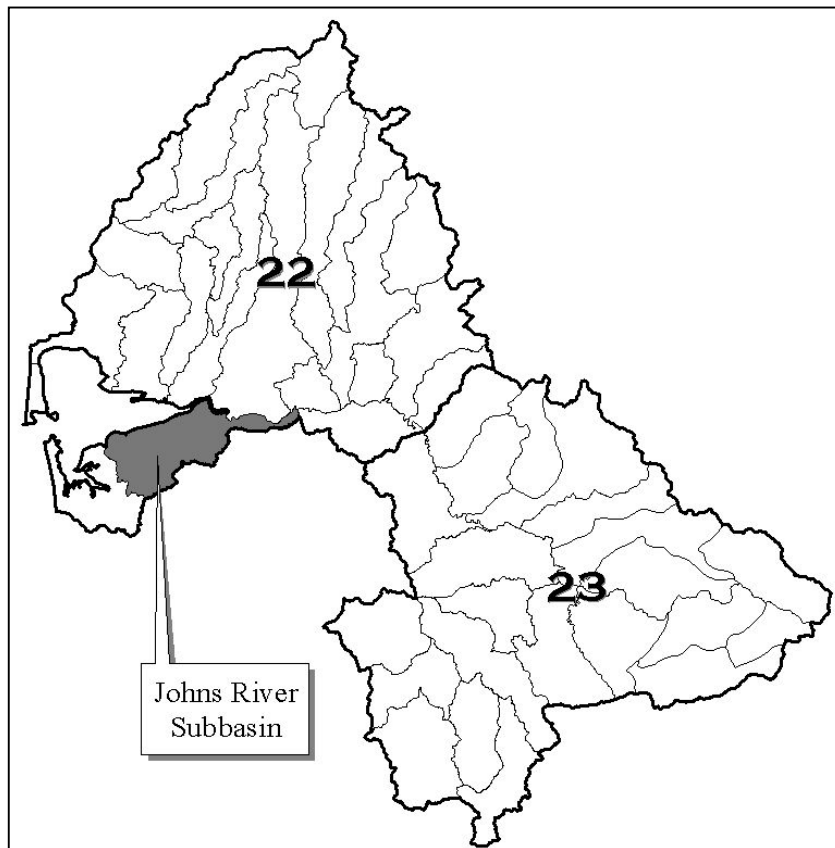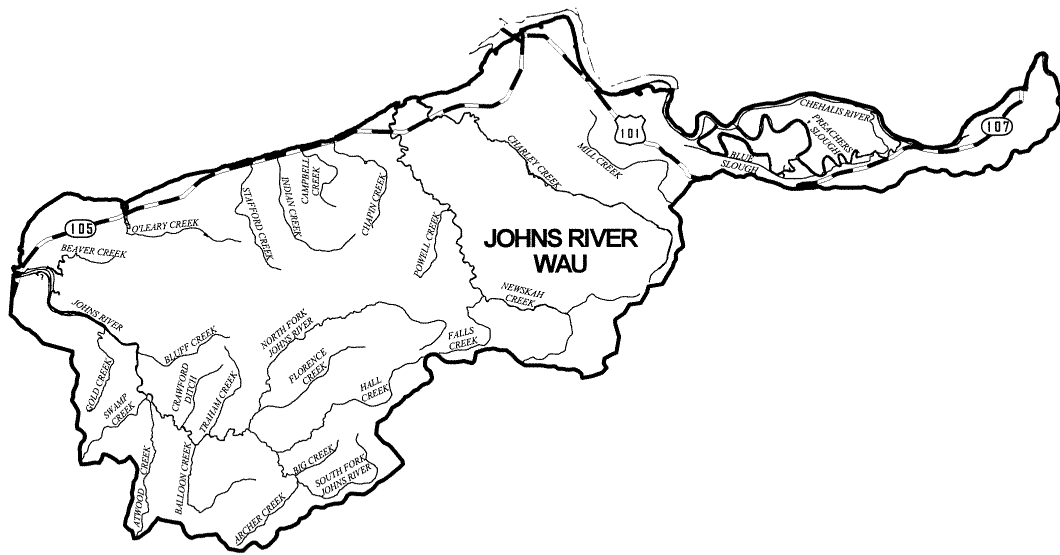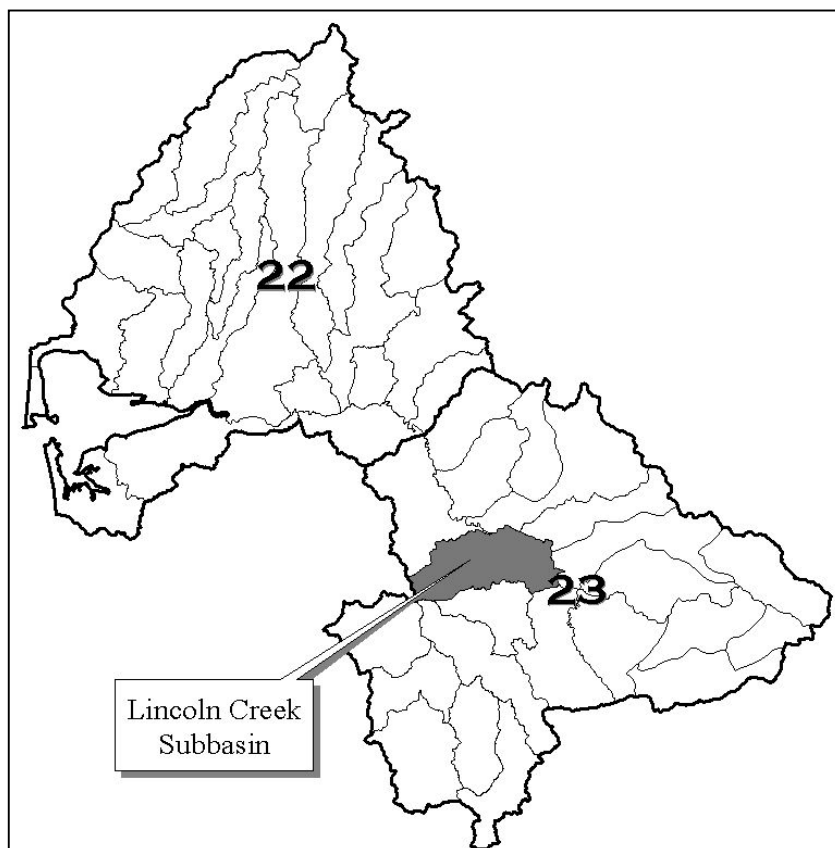|	
WAU Acreage	51,010.8
WAU's	Johns River
Major Tributaries	
Major Land Uses	Mostly forestry, some rural residential
Landownership	Private
Number and Type of Anadromous Fish Stocks	4: fall chinook, coho, winter steelhead, chum
Number of Anadromous Fish Habitat Miles	24.71 miles
Chehalis Watershed Subbasin Priority	Medium

Johns River
Subbasin

Johns River
Subbasin

CHEHALIS RIVER
PREACHERS SLOUGH
107
BLUFF SLOUGH
MILL CREEK
CHARLEY CREEK
101
CAMPBELL CREEK
INDIAN CREEK
CUNDIN CREEK
POWELL CREEK
STAFFORD CREEK
JOHNS RIVER WAU
NEWSKAH CREEK
105
O'LEARY CREEK
BEAVER CREEK
JOHNS RIVER
NORTH FORK JOHNS RIVER
FALLS CREEK
BLUFF CREEK
FLORENCE CREEK
HALL CREEK
GOLD CREEK
SWAMP CREEK
CRAWFORD DITCH
TRAHAM CREEK
ATWOOD CREEK
BALLOON CREEK
BIG CREEK
SOUTH FORK JOHNS RIVER
ARCHER CREEK

N

4   0   4 Miles

Johns River Subbasin
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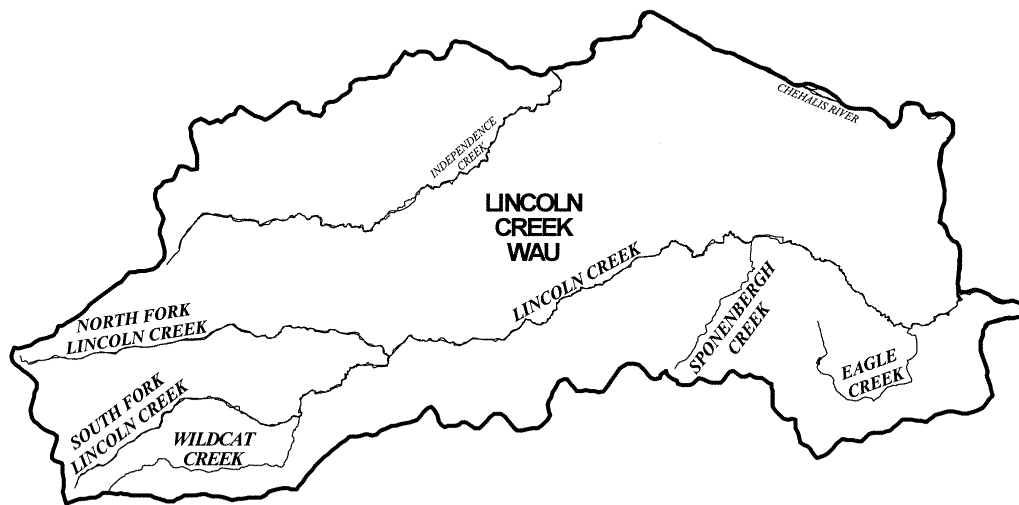| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG, high road density	**H-** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H-** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M-** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M-** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Good (DG)	**L-** Reconnect potential off-channel habitat. **L-** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, prioritize, and conserve off-channel and side channel habitat and associated riparian.	**L-** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). High road density> 3 mi./sq. mi., high landslide potential.	**H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc.	**H -** Enforce forest practice regulations.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H -** Assess sediment delivery and source in upper reaches of Subbasin. Prioritize restoration actions.
LWD	DG	**L-** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**L-** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement)
Riparian	(DG) Good in lower Johns; Fair in middle reaches, and poor in upper Johns due to timber harvest practices.	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H-** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Good (DG) but likely poor in Newskah Creek.	**H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **M -** Remove cedar waste (spaults) from Newskah Creek. **L -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**M -** Clarify sources of fecal load. **M -** Monitor water temperature, dissolved oxygen, pH, and turbidity.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quantity	Good (DG)	**M -** Reduce water withdrawals from surface sources. **M -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **M -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**L** – Monitor stream flow.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Lincoln Creek Subbasin

WAU Acreage	48,245.0
WAU's	Lincoln Creek
Major Tributaries	Eagle, Sponenberg, Wildcat, & North and South Fork Lincoln Creeks
Major Land Uses	Forestry and rural residential
Landownership	Private
Number and Type of Anadromous Fish Stocks	2: coho and winter steelhead
Number of Anadromous Fish Habitat Miles	36.88
Chehalis Watershed Subbasin Priority	Medium

Lincoln Creek Subbasin

Lincoln Creek
Subbasin

CHEHALIS RIVER

INDEPENDENCE CREEK

**LINCOLN
CREEK
WAU**

LINCOLN CREEK

NORTH FORK
LINCOLN CREEK

SPONENBERGH
CREEK

EAGLE
CREEK

SOUTH FORK
LINCOLN CREEK

WILDCAT
CREEK

N

4   0   4 Miles
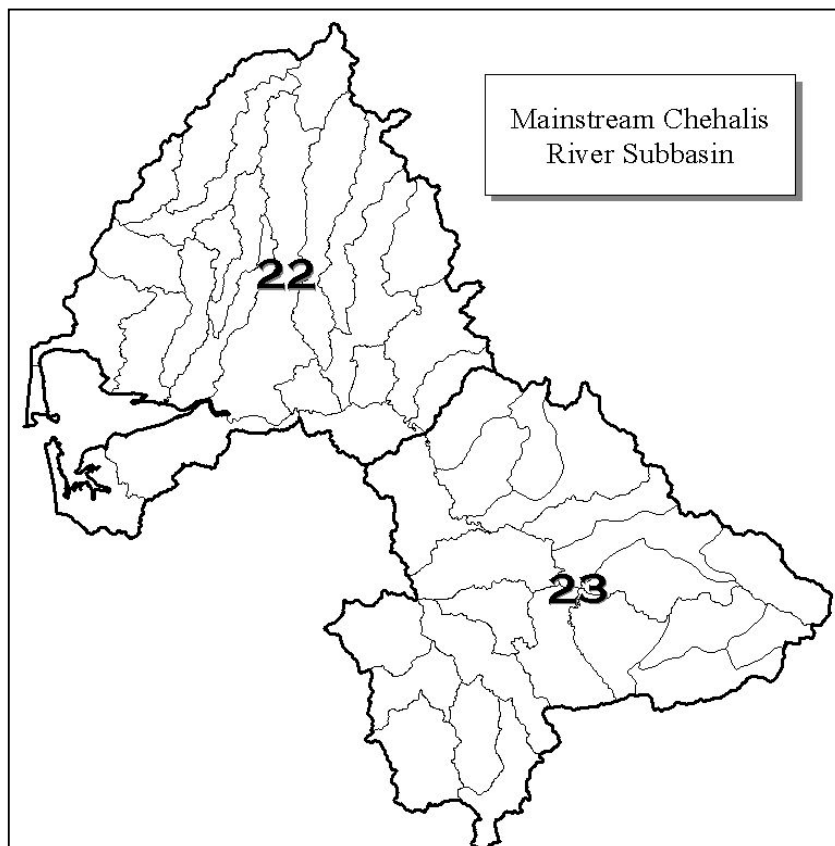
Lincoln Creek Subbasin
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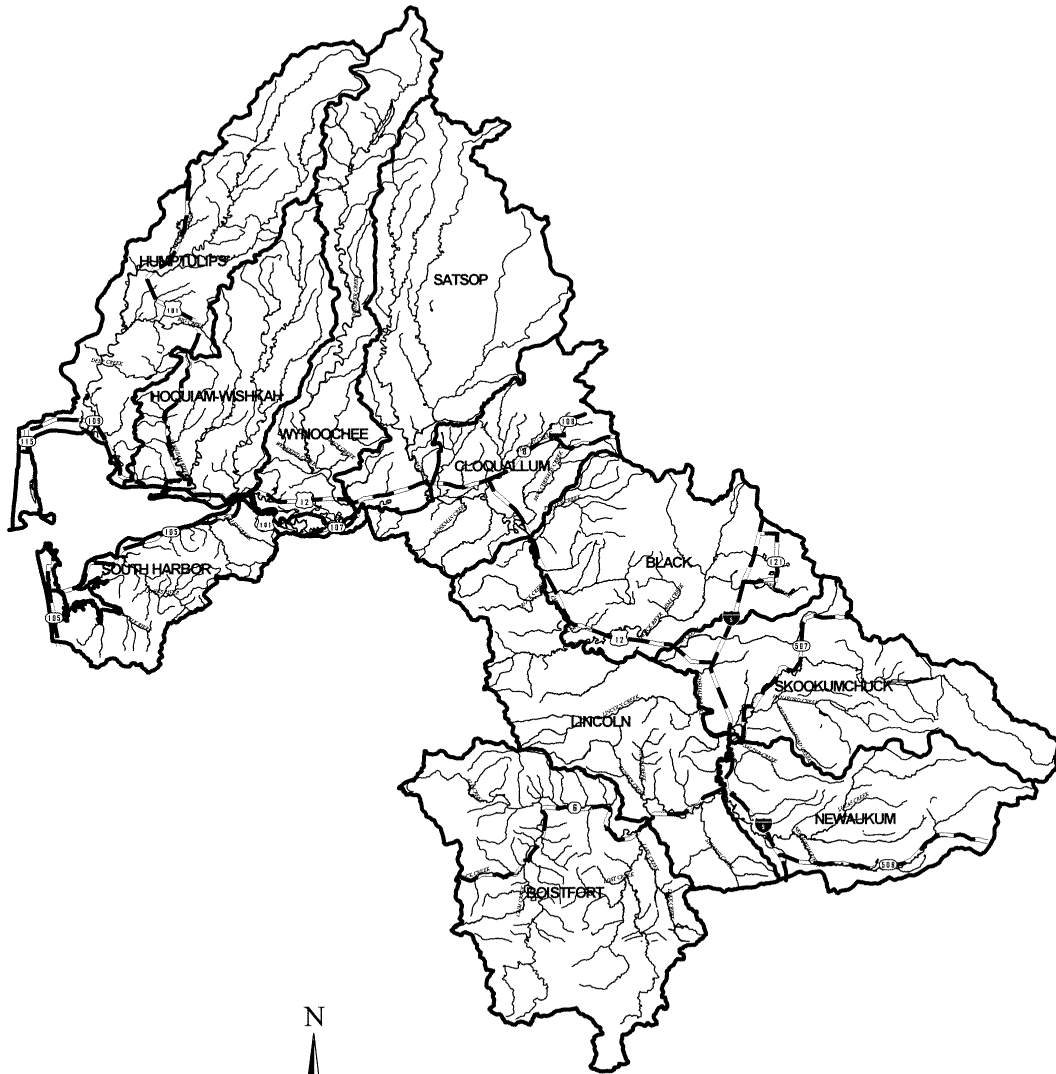| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG Suspect Poor, numerous culverts, high road density (3.4 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Fair (DG). Rip-rap, roads within floodplain.	**H -** Reconnect potential off-channel habitat. **L -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels. Would not consider LWD projects as high priority within lower areas of Lincoln Creek.	**H -** Maintain and conserve off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). Bank erosion, siltation of spawning areas, vehicle activity, livestock access, high road density.	**M -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Reduce livestock access to streams. **M -** Provide education regarding the impacts of livestock. **M -** Provide education regarding the impacts of vehicle activity in streams. Increase enforcement to decrease this activity.		**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly.
LWD	DG	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchor LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).
Riparian	Poor (DG) Livestock access.	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas. **H -** Fence riparian to protect vegetation.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H -** Assess and prioritize recovery and protection for riparian conditions.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	Poor warm water temperatures, low dissolved oxygen, leaking septic system, livestock access, reduced riparian, bank erosion, and scour	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce livestock access to streams. **H** - Implement TMDL for water temperature and pH. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**L** - Assess fecal coliform sources as they relate to increased BOD loads. **H** - Assess riparian conditions and prioritize areas for restoration.
Water Quantity	Poor. Low summer flows, water withdrawals, Increased peak flows, Scour.	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H -** Install a stream flow gage, and monitor stream flow. **H -** Determine actual water usage and water rights.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Mainstem Chehalis River

WAU Acreage	2,031,679.1
WAU's	--
Major Tributaries	--
Major Land Uses	Forestry (85%), agriculture (10%), urban (5% - mostly Chehalis, Centralia, Aberdeen, & Hoquiam)
Landownership	Mostly private with some state and federal ownership in the upper reaches
Number and Type of Anadromous Fish Stocks	7 – summer Chinook, fall Chinook, spring Chinook, coho, chum, winter steelhead, and summer steelhead
Number of Anadromous Fish Habitat Miles	118.9 miles
Chehalis Watershed Subbasin Priority	High

Mainstream Chehalis River Subbasin

22

23

Mainstream Chehalis
River Subbasin

N

20   0   20 Miles

Mainstem Chehalis River
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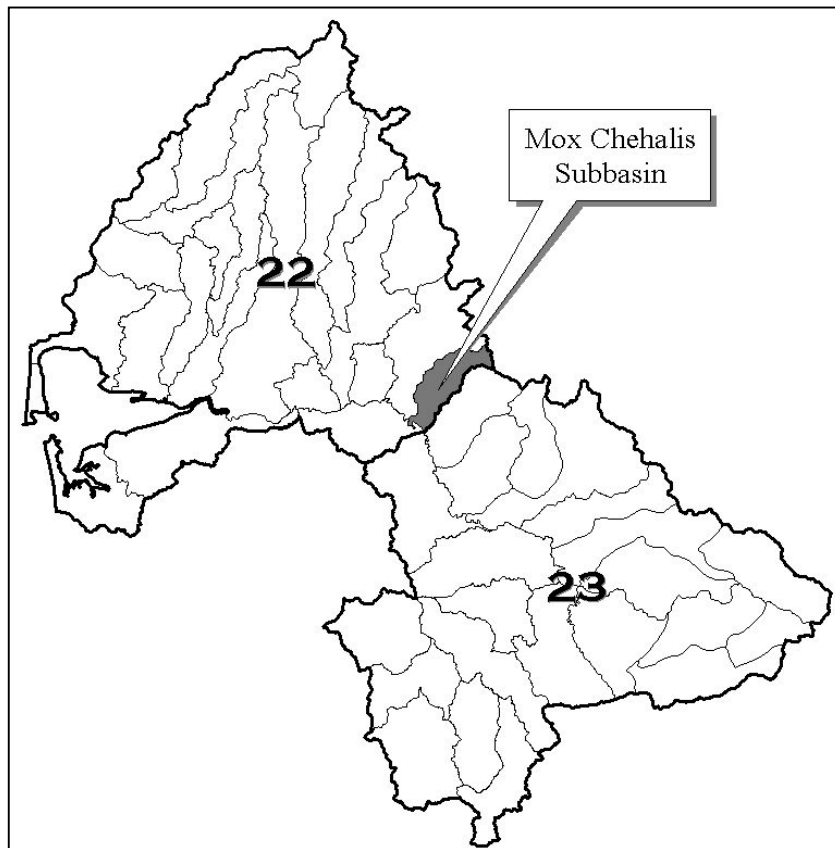
Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	Good, except for potential temperature blockage near Centralia.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages. **H –** Address potential water temperature blockage to juveniles and adults during the summer and fall low flow conditions.		**L -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **L -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor from mid to upper (DG). Known problems: incision, limited rearing habitat, bank protection (dikes).	**H -** Reconnect or create over-wintering, refuge habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes Appropriate riparian restoration to result in better future LWD levels. **H –** Remove riprap.	**H -** Conserve existing refuge, over-winter areas, especially the lower 10 miles of mainstem slough habitat identified in Ralph et al. (1994). **H –** Purchase flood easements from agricultural interests, let river flood here. **M –** Preserve beaver dams.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory. Use information to guide future projects and to provide a more accurate rating of mainstem floodplain conditions. **H –** Identify refuge areas.
Sediment	Poor. Known problems: high sediment transport, debris torrents, bank erosion.	**H -** Reduce sediment loads and increase LWD to slow sediment transport in the Satsop, Wynoochee, upper Chehalis (upstream of Doty), South Fork Chehalis, and Newaukum Subbasins. These contribute the greatest sediment loads to the mainstem. **M -** Provide education regarding the impacts livestock access and increase enforcement. **H –** Rehabilitate old roads not used to reduce fines. **H –** Reduce bank erosion (riparian restoration, livestock exclusion, engineered logjams to deflect flows from eroding banks, etc.). **H –** Relocate gravel extraction activities away from shorelines and the 100-year floodplain.	**H -** Avoid activities that would increase sedimentation along the left bank (looking downstream) of the mainstem from RM 11.5-21. This is an area prone to landslides and erosion. **M –** Provide incentives for landowners to preserve spawning areas.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **M –** Survey cross-sections of the river every 2-5 years to determine extent of channel changes.
LWD	Poor (DG)	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. In the mainstem, the most viable option in most reaches is increasing natural recruitment through riparian restoration. In some areas, trees with attached rootwads could be placed in banks to help capture migrating pieces.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (E.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement)

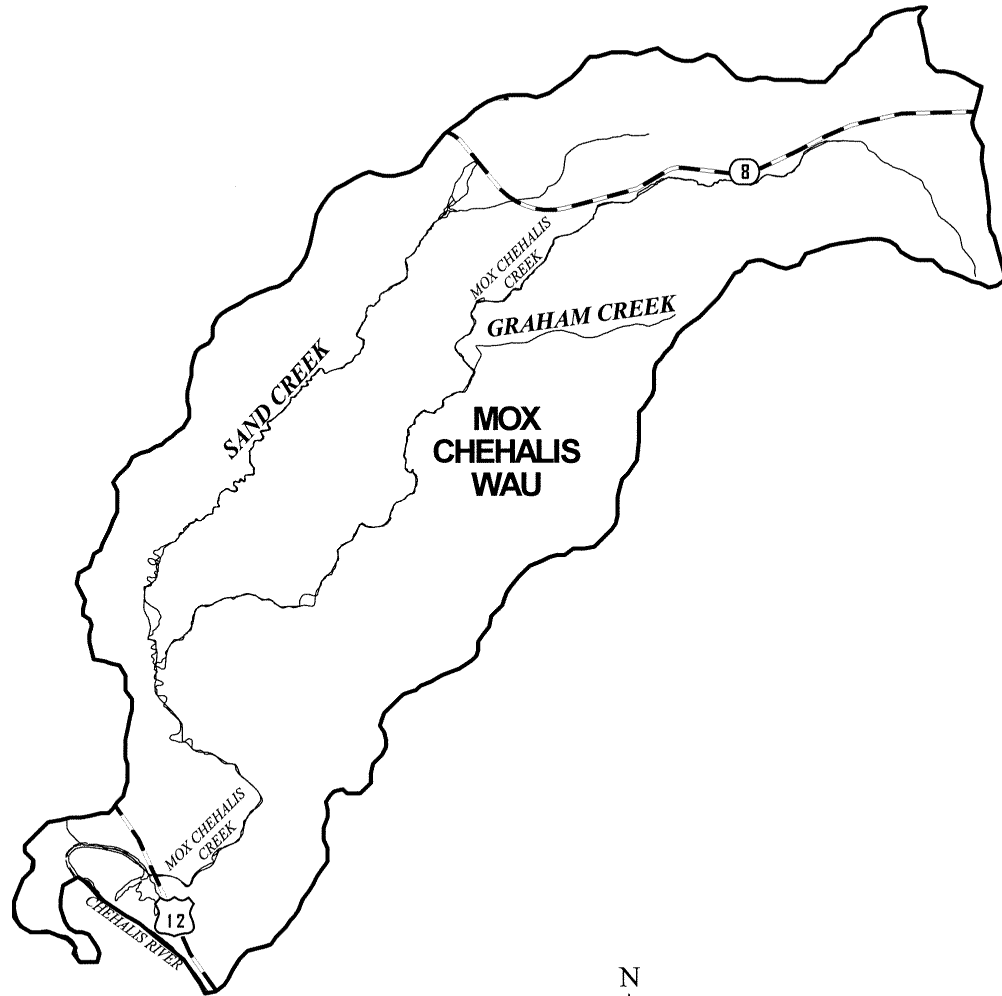| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor (DG). Known Problems: riparian loss, conversion to hardwoods.	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. Prioritize as follows 1) mainstem between Newaukum River and Skookumchuck River, 2) mainstem between Skookumchuck River and Scatter Creek, 3) mainstem between Scatter Creek and Porter, 4) mainstem from Elk Creek to Newaukum River, 5) mainstem headwaters to Elk Creek, and 6) all other mainstem reaches. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Poor. Known problems: warm water temperatures, low dissolved oxygen (causes: low flows, riparian loss, sediment loads, livestock waste, urban stormwater).	**H** - Actions need to address sediment, riparian, and flow problems. Follow prioritized riparian restoration recommendations discussed above to improve water temperature conditions. **H** - Reduce livestock access to streams. **H** - Reduce livestock waste delivery to streams, especially in reaches from Porter to Scammon Creek, and from the Newaukum River to the East and West Fork confluence. **H** - Prioritize livestock waste reduction in the following tributaries in this order: 1) Salzer Creek, 2) Dillenbaugh Creek, 3) South Fork Chehalis River, 4) Black River, 5) Lincoln Creek, 6) Independence Creek, and 7) Scatter Creek. These tributaries contribute high BOD loads that result in low dissolved oxygen levels in the mainstem. **H** - Reduce urban stormwater and food processing plant inputs into the drainage near the cities of Centralia and Chehalis to improve dissolved oxygen conditions. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat. **L** - Reduce groundwater inputs of contaminants, especially near Aberdeen, Hoquiam, Centralia, and Chehalis. Address failing septic systems and improve agricultural practices near Montesano, Elma, the Chehalis Indian Reservation, and near Dillenbaugh and Berwick Creeks.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **H –** Preserve riparian areas. **H –** Buy water rights that result in actual increases in stream flow (senior rights preferred).	**H –** Continue to monitor water temperature, dissolved oxygen, pH, and turbidity and several sites throughout the length of the mainstem.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quantity	Poor. Known problems: low flows due to water use, loss of wetlands, loss of forestlands.	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.** **H –** Buy back water rights, prioritizing those that actually increase stream flow (senior rights). **H -** Encourage and reward water conservation efforts, especially for irrigation, hydropower, and domestic use (the three greatest water consumers in the drainage).	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **H –** Implement a moratorium on any further withdrawals.	**L –** Install staff gauges in the lower mainstem, and monitor stream flows.
Biological Processes	Known problems: need more complete salmonid escapement information, also lowered escapements from past levels.	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses. **H –** Catalog pools, ripples, spawning rearing areas and use by species.	**H -** Continue escapement data collection.	**H -** Increase field surveys regarding salmonid distribution, escapement and habitat use by life history stage. **L -** Assess marine-derived nutrient processes. **H –** Collect data on fish use and stream characteristics.

Mox Chehalis Creek Subbasin

WAU Acreage	19,073.4
WAU's	Mox Chehalis
Major Tributaries	Sand and Graham Creeks
Major Land Uses	Rural residential, livestock, forestry
Landownership	Private and public (Capital State Forest)
Number and Type of Anadromous Fish Stocks	3: fall chinook, winter steelhead, coho
Number of Anadromous Fish Habitat Miles	20.4 miles
Chehalis Watershed Subbasin Priority	Medium

Mox Chehalis
Subbasin

SAND CREEK

MOX CHEHALIS CREEK

GRAHAM CREEK

MOX
CHEHALIS
WAU

MOX CHEHALIS CREEK

CHEHALIS RIVER

8

12

N

2   0   2 Miles
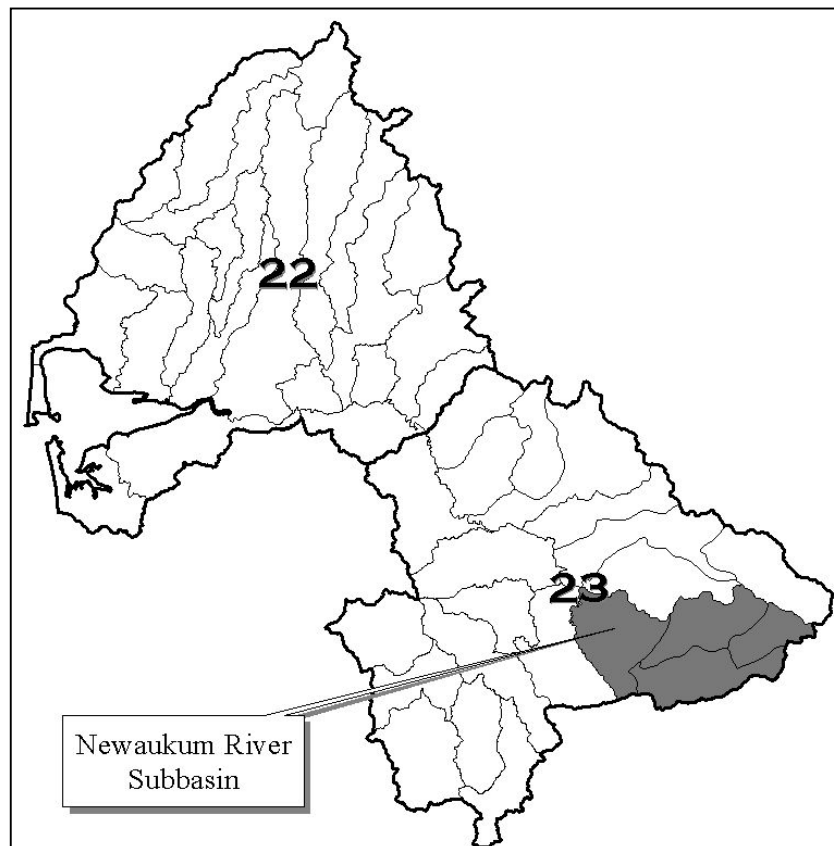
Mox Chehalis Creek Subbasin
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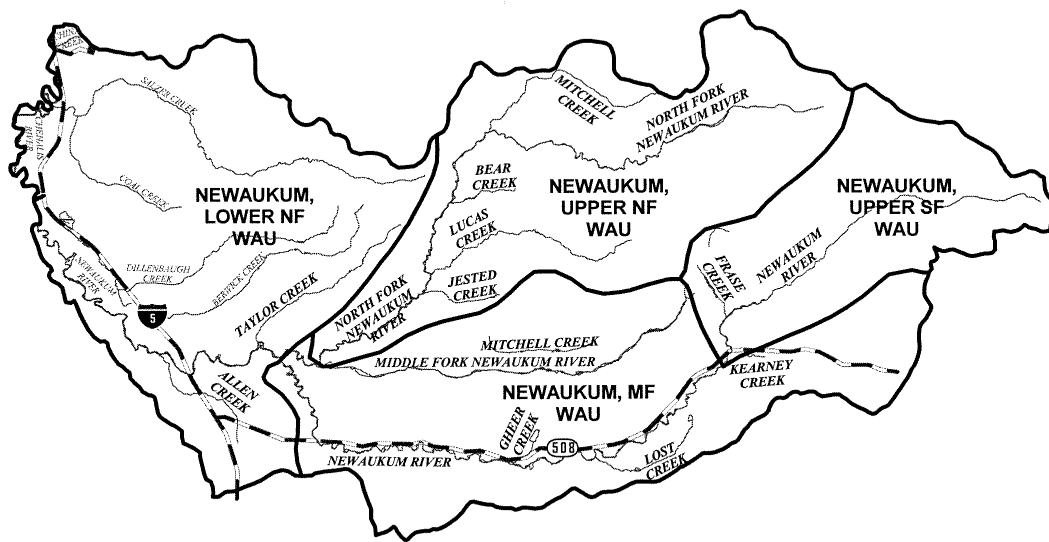| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG High road density (4.7 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG) Rip-rap, confined by roads, filled and rerouted.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels **H -** Fence livestock and reconnect/reconstruct off-channel habitat.	**H -** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian. .	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory. **H -** Assess agricultural effects, road effects, residential effects
Sediment	Poor (DG) High road density, road confinement, bank erosion, Excessive sediment, vehicle activity.	**H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **L -** Provide education regarding the impacts of vehicle activity in streams and increase enforcement. **M -** Provide education regarding the impacts of livestock. **H -** Reduce livestock access.	**H -** Allow watershed time to recover from logging.	**H -** Inventory roads and assess impacts to salmon and steelhead as well as prioritize restoration actions. **H -** Assess bank failures, LWD, bulkheads and bank confinement.
LWD	Poor (DG)	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).. **H -** Increase conifers in riparian zones.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).
Riparian	Poor (DG)	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas. **H -** Fence and revegetation where needed.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H -** Assess and prioritize recovery and protection for riparian conditions. **H -** Assess cause of riparian degradation (it is listed as unknown).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	DG. Poor riparian, livestock access, road run-off.	H - Actions need to address sediment, riparian, and flow problems. H - Reduce livestock access to streams. H - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. H - Restore wetlands and off-channel habitat. H - Fence livestock and reduce road activities that contribute to sediment. Revegetate riparian.	H - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	H - Review and assess water temperature, dissolved oxygen, road runoff, livestock access, and riparian degradation.
Water Quantity	Poor (DG). Poor hydraulic maturity, low summer flows.	H - Reduce water withdrawals from surface sources. H - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. H -Restore wetlands and off-channel habitat.	H - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	H - INSTALL STREAM FLOW GAGE, AND MONITOR STREAM FLOW. H - ASSESS SUMMER FLOWS, WATER WITHDRAWALS, AND WATER RIGHTS.
Biological Processes	DG	L - Increase contribution of marine –derived nutrients through increased use of carcasses.		H - Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. L - Assess marine-derived nutrient processes.

Newaukum River Subbasin

WAU Acreage	127,822.5
WAU's	Lower NF, MF, Upper NF, & Upper SF Newaukum
Major Tributaries	North, Middle, & South Forks, Taylor, Allen, Gheer, Lucas, Mitchell & Johns Fork Creeks
Major Land Uses	Forestry, agriculture, & rural residential
Landownership	Private
Number and Type of Anadromous Fish Stocks	4: spring chinook, fall chinook, coho, & winter steelhead, and cutthroat
Number of Anadromous Fish Habitat Miles	119.06 miles
Chehalis Watershed Subbasin Priority	High

22

23

Newaukum River
Subbasin

Newaukum River
Subbasin

NEWAUKUM,
LOWER NF
WAU

NEWAUKUM,
UPPER NF
WAU

NEWAUKUM,
UPPER SF
WAU

NEWAUKUM, MF
WAU

MITCHELL
CREEK

NORTH FORK
NEWAUKUM RIVER

BEAR
CREEK

LUCAS
CREEK

JESTED
CREEK

FRASE
CREEK

NEWAUKUM
RIVER

NORTH FORK
NEWAUKUM
RIVER

MITCHELL CREEK

MIDDLE FORK NEWAUKUM RIVER

KEARNEY
CREEK

GHEER
CREEK

LOST
CREEK

NEWAUKUM RIVER

508

5

ALLEN
CREEK

TAYLOR CREEK

DILLENBAUGH
CREEK

BERWICK CREEK

COAL CREEK

SILVER CREEK

NEWAUKUM RIVER

CHEHALIS RIVER

N

5   0   5 Miles

Newaukum Creek Subbasin.
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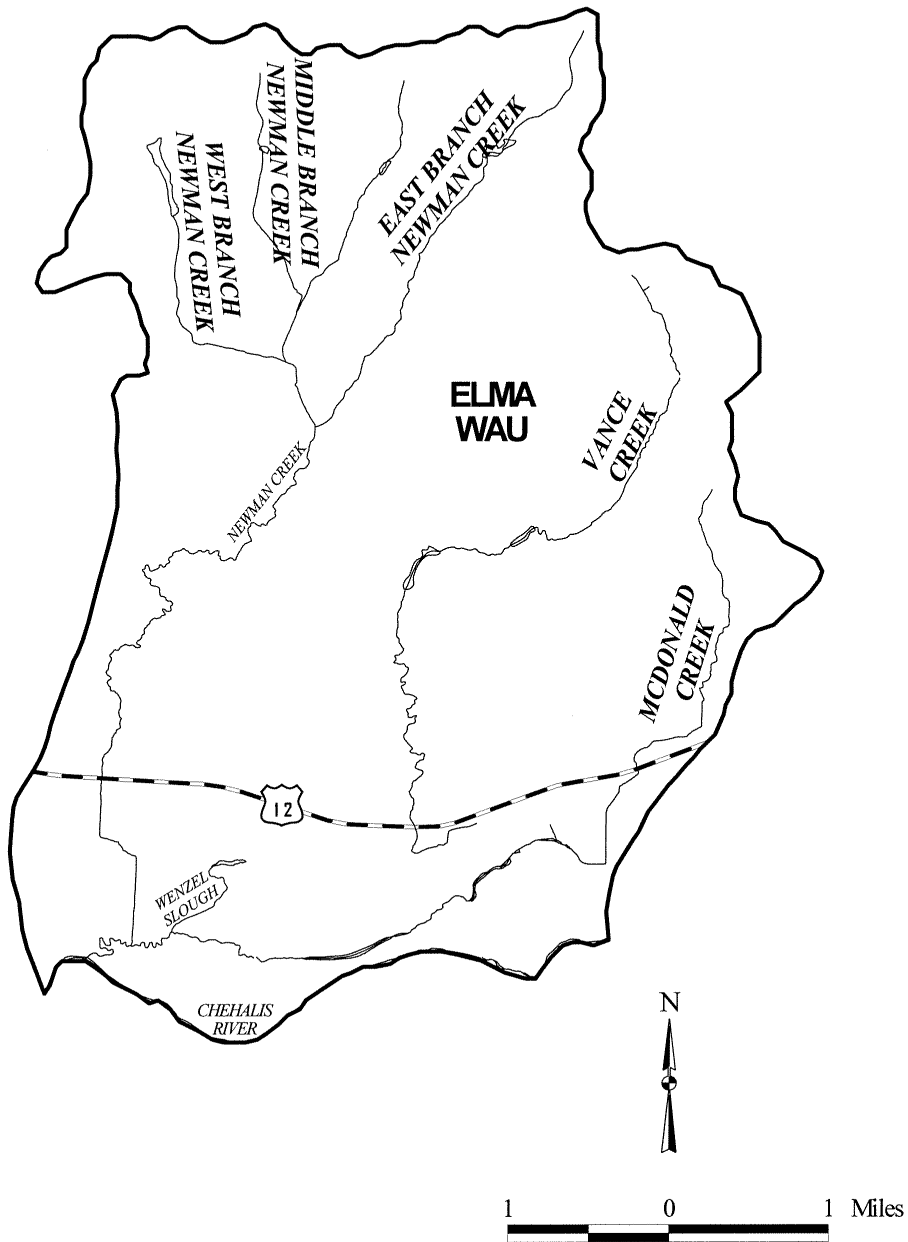| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG, Suspect Poor. High road density (4.2 mi/sq mi) and initial culvert inventory lists extremely high number of potential blockages.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H** - Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG). Rip-rap, dikes, roads, wetland loss (fill), decline in beaver activity.	**H** - Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels. **H** - Reduce bank protection.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian. **H** - Prevent further diking, rip-rap, and other bank protection.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). High road densities, landslides caused by roads, high bank erosion and livestock access.	**H**- Decommission roads at risk of landslides, especially side-cast roads. **H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H** - Reduce livestock access to streams. **H** - Increase protection of steep and unstable slopes. **H** - Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **M -** Provide education regarding the impacts of livestock access to streams. **M** - Increase enforcement and provide education regarding the impacts of vehicle activity in streams.	**H** - Protect existing good quality spawning habitat. **M** - prevent further degradation of unstable banks.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H** - Inventory, prioritize, and list causes of bank erosion.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
LWD	Good in upper; DG (likely poor) in lower.	**L -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration). This priority level might change to high after assessment in lower reaches is completed.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M** - Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement). **M** - Conduct surveys to determine LWD levels, pool habitat, and riparian conditions in the lower drainage.
Riparian	Poor in lower, mixed in upper.	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer and hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**M** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Poor (DG). Warm water temperatures and high turbidity. Causes: riparian loss, sedimentation, livestock.	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce livestock access to streams. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Implement TMDL for water temperature and pH. **H** - Restore wetlands and off-channel habitat.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Continue to monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor (DG) in lower; good (DG) in upper. Not meeting base flows, poor hydrological maturity except in upper NF and SF where hm is good. Water withdrawn for City of Chehalis and agriculture.	**H** - Actions need to address sediment, riparian, and flow problems. **H -** Reduce water withdrawals from both surface and ground sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Continue monitoring stream flows.
Biological Processes	Fair (DG)	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Newman/Vance Creeks Subbasin

WAU Acreage	15,304.5
WAU's	Elma
Major Tributaries	West, Middle and East Branches, Newman and McDonald creeks
Major Land Uses	Agriculture and rural residential
Landownership	Private
Number and Type of Anadromous Fish Stocks	1: coho
Number of Anadromous Fish Habitat Miles	6.6 miles
Chehalis Watershed Subbasin Priority	Low
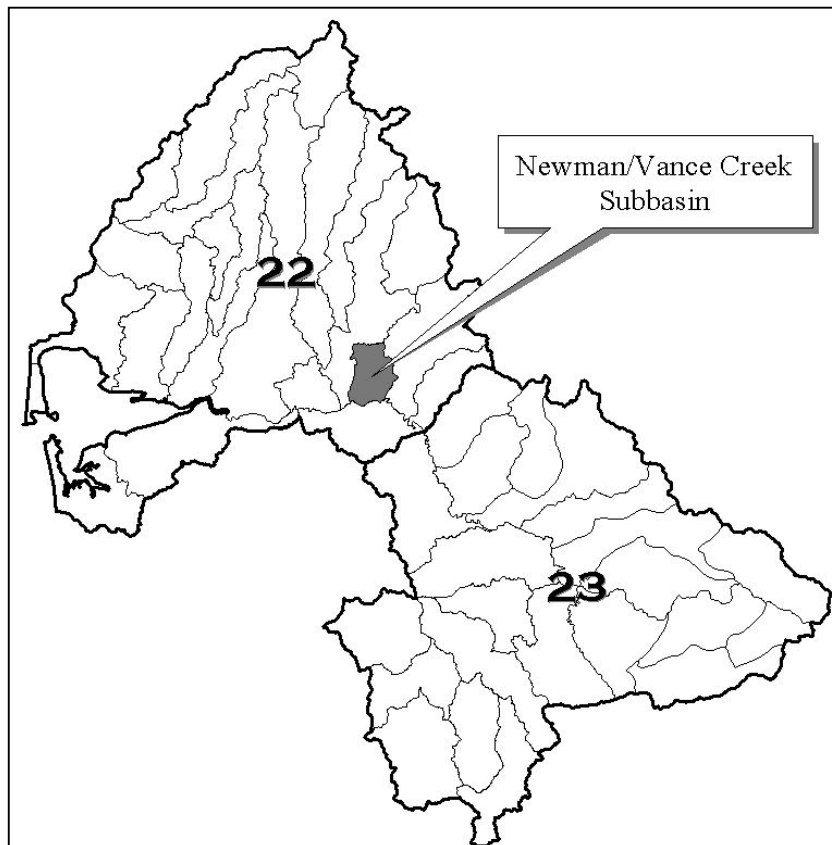
Newman/Vance Creek Subbasin

Newman/Vance Creek Subbasin

MIDDLE BRANCH NEWMAN CREEK

WEST BRANCH NEWMAN CREEK

EAST BRANCH NEWMAN CREEK

ELMA WAU

VANCE CREEK

NEWMAN CREEK

MCDONALD CREEK

12

WENZEL SLOUGH

CHEHALIS RIVER

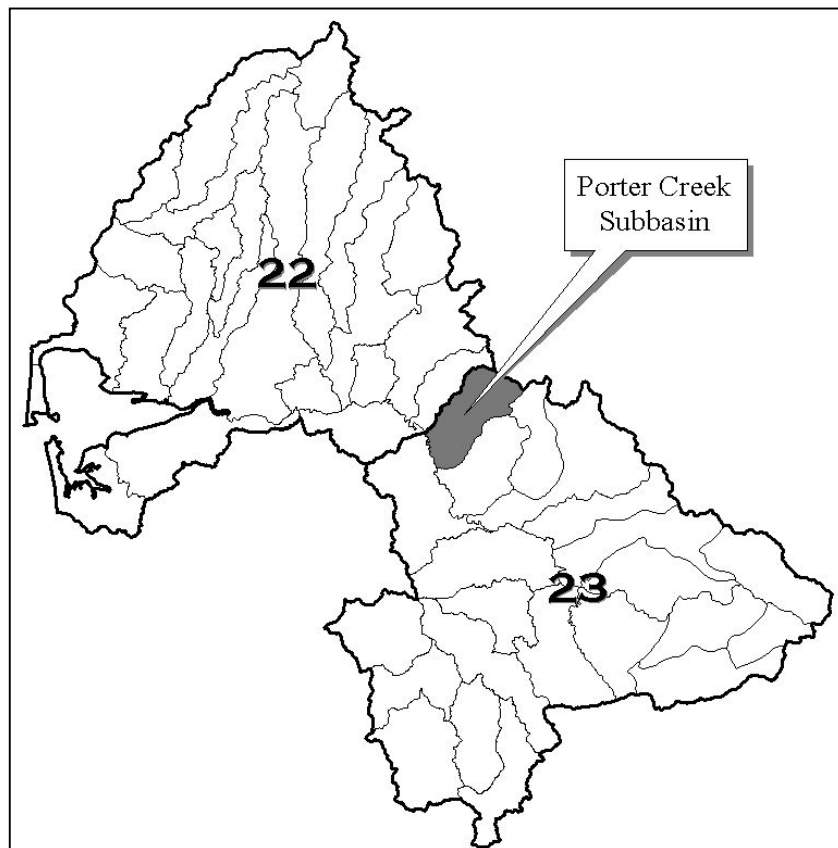N

1   0   1 Miles

Newman / Vance Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

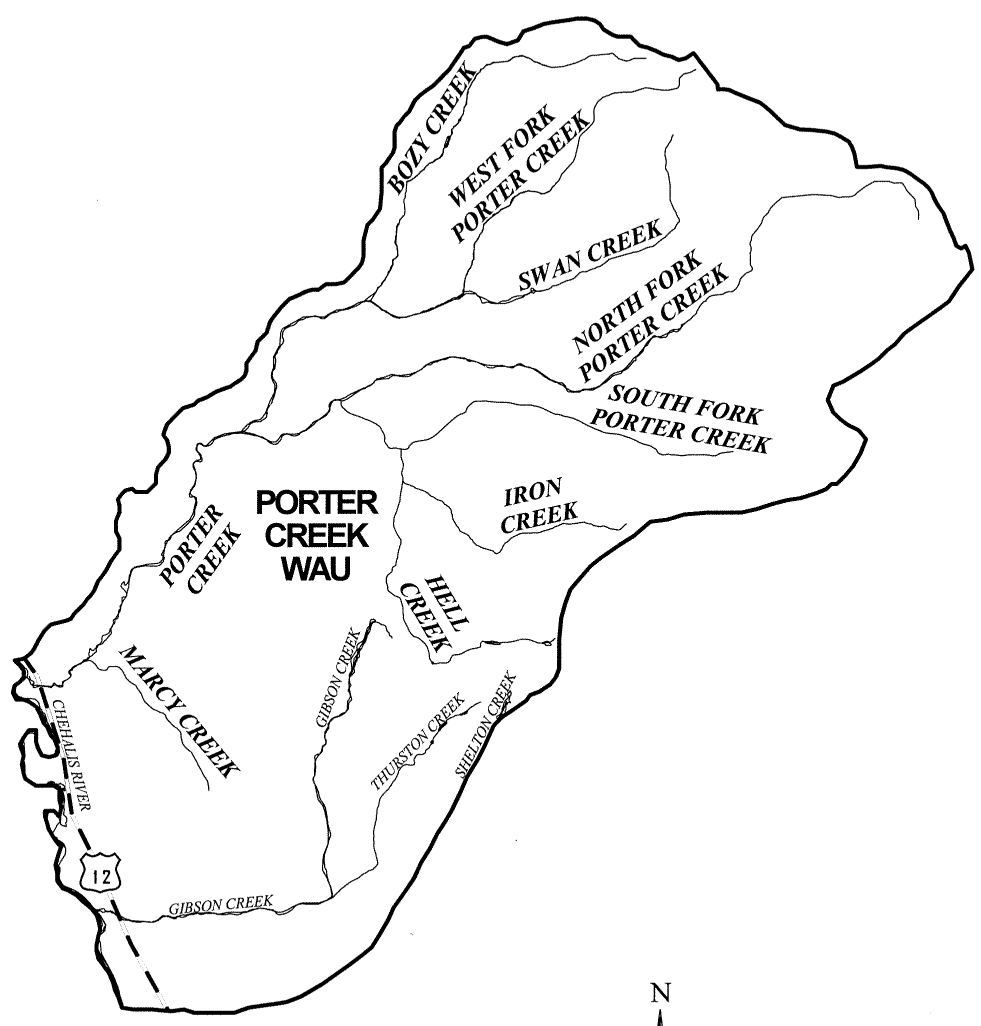| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. High road density (4.71 miles of road/square mile watershed)	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG). Road impacts, landuse conversion, splash dams, bank armoring, and channelization.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, prioritize, and conserve off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). High road density, Some areas of excessive bank erosion.	**L -** Provide education regarding the impacts of vehicle activity in streams and increase enforcement. **H –** Decommission/relocate high impact side-cast and stream adjacent parallel roads. **H –** Improve drainage to high impact roads to reduce direct sediment delivery to streams. **H –** Reduce livestock access to both Vance Creek and Newman Creek. **H –** Prioritize existing bank armoring projects for removal/modification.		**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H -** Inventory extent and causes of bank erosion and prioritize restoration actions.
LWD	DG	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration)..	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement)
Riparian	Poor (DG) 91% is in poor condition.	**H -** Revegetate open riparian areas with native plants including conifers in historical/appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	DG Poor riparian conditions	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce livestock access to both Vance Creek and Newman Creek. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H -** Conduct water quality assessment (temperature and dissolved oxygen), and identify activities to correct water quality problems.
Water Quantity	Poor (DG). Poor hydrological maturity.	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Install flow gauge and monitor stream flows.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Porter Creek Subbasin

WAU Acreage	32,900.4
WAU's	Porter Creek
Major Tributaries	North and South Fork Porter Creeks
Major Land Uses	Rural residential & agriculture in floodplains, forestry in uplands
Landownership	Private, public (Capital State Forest)
Number and Type of Anadromous Fish Stocks	3: fall chinook, coho, & winter steelhead
Number of Anadromous Fish Habitat Miles	14.97 miles
Chehalis Watershed Subbasin Priority	Low

Porter Creek
Subbasin

BOZY CREEK

WEST FORK
PORTER CREEK

SWAN CREEK

NORTH FORK
PORTER CREEK

SOUTH FORK
PORTER CREEK

IRON
CREEK

PORTER
CREEK

**PORTER
CREEK
WAU**

HELL
CREEK

PORTER
CREEK

MARCY CREEK

GIBSON CREEK

THURSTON CREEK

SHELTON CREEK

CHEHALIS RIVER

12

GIBSON CREEK

N

2   0   2 Miles

Porter Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	(DG) Road density is fair. (2.9 mi/sq mi)	**H** - Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects of less than three miles addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H** - Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M** - Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M** - Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	(DG) Low levels of rip-rap, no channelization.	**L** - Reconnect potential off-channel habitat. **M** - Restoration actions need to increase instream LWD to help address channel incision. This includes appropriate riparian restoration to result in better future LWD levels.	**H** – Maintain, prioritize, and conserve off-channel and side channel habitat and associated riparian.	**L** - Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Fair (DG) Fair road density, moderate bank erosion and livestock access.	**M** – Decommission roads at risk of landslides, especially side-cast roads. **M** – Correct high impact road sediment delivery problems via push-outs, cross-drains, sediment traps etc. **M** – Increase protection of steep and unstable slopes. **M** – Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **M** – Reduce livestock access to streams. **M** – Provide education regarding the impacts of livestock.		**M** – Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **M** – Conduct a landslide inventory. **M** – Update the surface erosion degradation database collected in Wampler et al. (1993).
LWD	DG	**M** - Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD or increasing natural recruitment potential (riparian restoration).	**H** – Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**L** - Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor (DG)	**H** - Revegetate open riparian areas with native plants including conifers in appropriate places. **M** - Interplant conifer into hardwood riparian areas that were historically conifer areas. **M**- Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H** - Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H** – Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	(DG) Poor riparian.	**H** - Actions need to address sediment and riparian flow problems. **H** - Reduce livestock access to streams. **H** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Good (DG)	**L** – Reduce water withdrawals from surface sources. **L** – Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **L** – Restore wetlands and off-channel habitat.	**M** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**L** – Install a stream flow gage, and monitor stream flows.
Biological Processes	DG	**L** - Increase contribution of marine–derived nutrients through increased use of carcasses.		**H** - Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L** - Assess marine-derived nutrient processes.

Rock Creek Subbasin

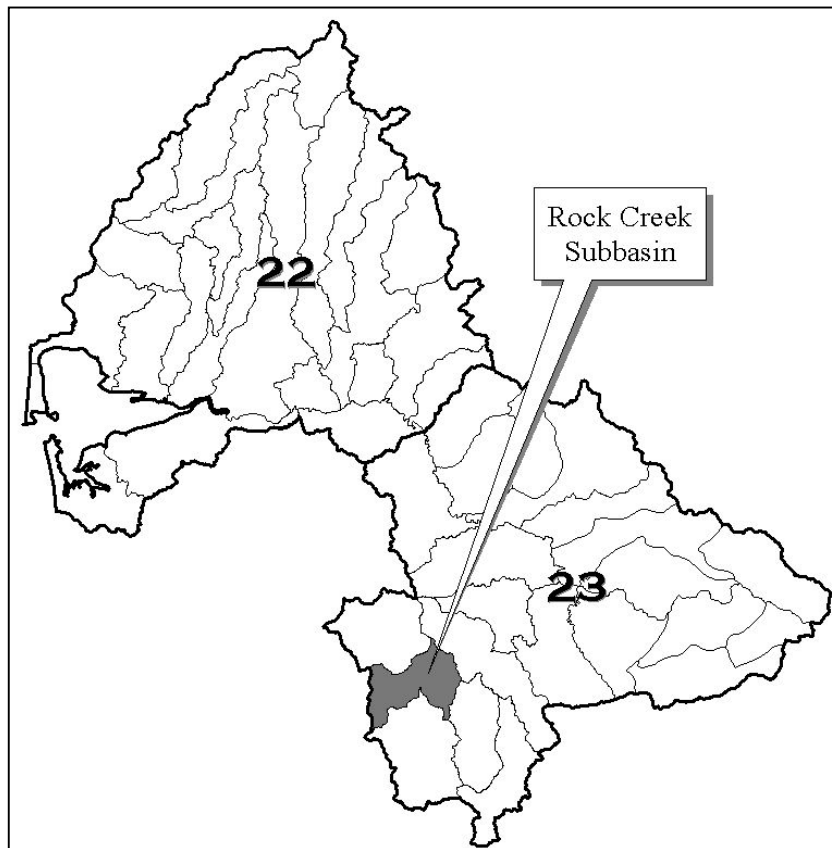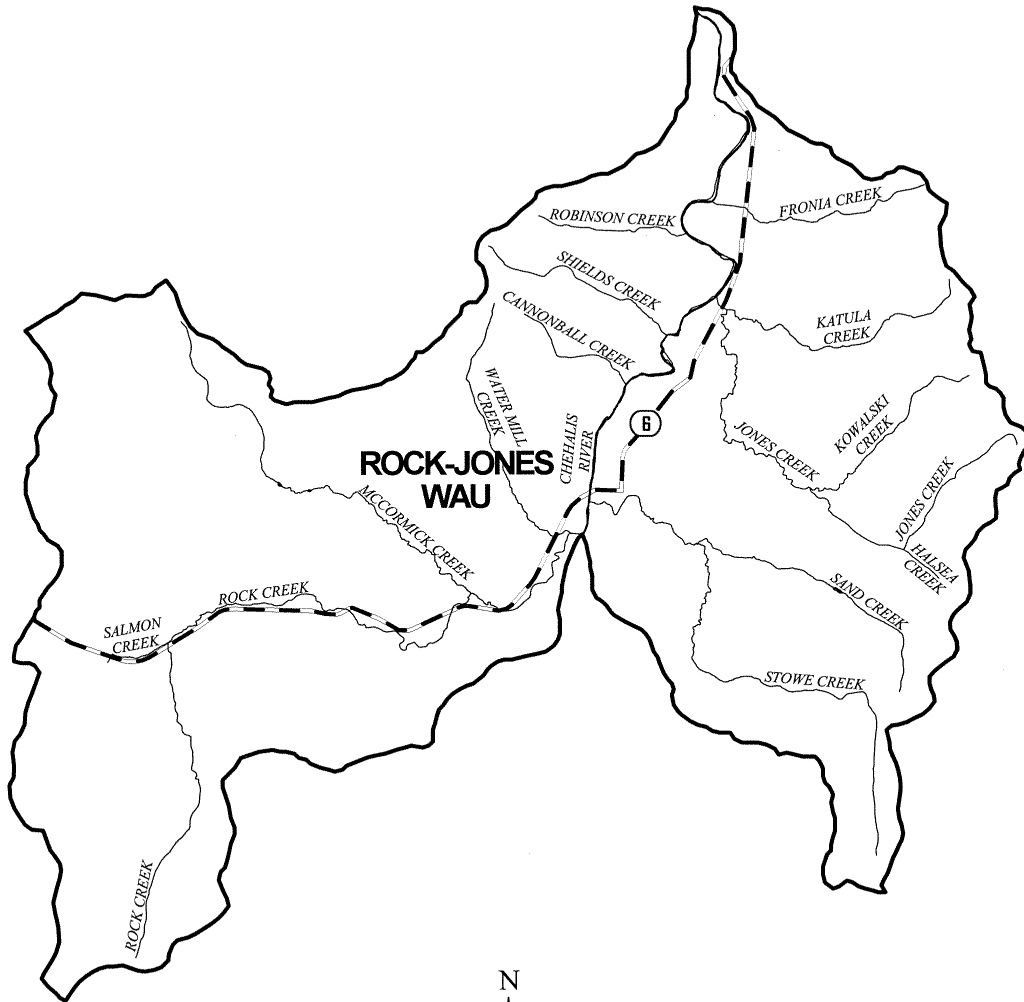|	
WAU Acreage	28,329.6
WAU's	Rock-Jones
Major Tributaries	
Major Land Uses	Rural residential, agriculture, forestry
Landownership	Private and public
Number and Type of Anadromous Fish Stocks	3: fall chinook, coho, winter steelhead, and cutthroat
Number of Anadromous Fish Habitat Miles	24.39 miles
Chehalis Watershed Subbasin Priority	Medium

Rock Creek
Subbasin

ROBINSON CREEK

FRONIA CREEK

SHIELDS CREEK

CANNONBALL CREEK

KATULA CREEK

WATER MILL CREEK

ROCK-JONES WAU

CHEHALIS RIVER

6

KOWALSKI CREEK

JONES CREEK

JONES CREEK

MCCORMICK CREEK

HALSEA CREEK

ROCK CREEK

SAND CREEK

SALMON CREEK

STOWE CREEK

ROCK CREEK

N

2   0   2 Miles

Rock Creek (near Pe Ell) Subbasin
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The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

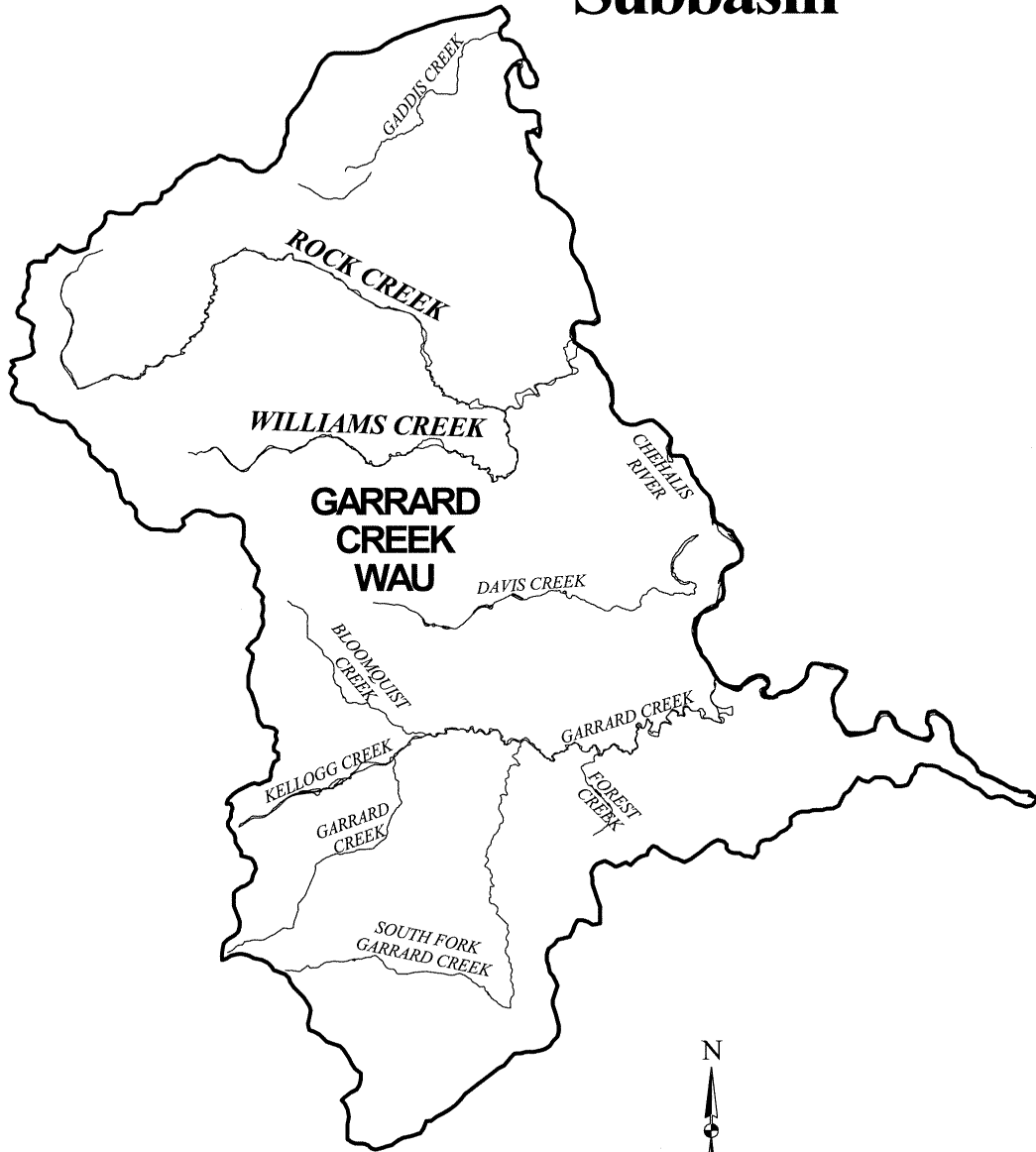| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. High road density.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H** - Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	DG	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, prioritize, and conserve off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory. **H** - Map historic versus current floodplain conditions.
Sediment	Poor (DG) Confined streams with low gradient, landslides due to recent timber harvest in geologically sensitive areas, high road density, high levels of bank erosion.	**H** - Decommission roads at risk of landslides, especially side-cast roads. **H** - Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H** - Increase protection of steep and unstable slopes. **H** - Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **M** - Reduce livestock access to streams. **L -** Provide education regarding the impacts of livestock access and increase enforcement.		**H -** Inventory roads and landslides and assess impacts to salmonids and prioritize restoration actions accordingly.
LWD	Poor in lower (DG).	**H** - Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H** - Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruitment, hydrology, structure size, gradient, LWD recruitment potential, and confinement).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Fair (DG)	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	DG	**H -** Actions need to address sediment, riparian, and flow problems. **M-** Reduce livestock access to streams. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H -** Monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor (DG) Poor hydrologic maturity, concern about increased peak flows.	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Reduce water withdrawals from both surface and ground sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**M -** Install stream flow gage and monitor stream flow.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Rock/Williams Creeks Subbasin

WAU Acreage	48,619.3
WAU's	Garrard
Major Tributaries	Williams Creek
Major Land Uses	Rural residential, agriculture, forestry
Landownership	Private
Number and Type of Anadromous Fish Stocks	3: fall chinook, coho, winter steelhead, and cutthroat
Number of Anadromous Fish Habitat Miles	24.39 miles
Chehalis Watershed Subbasin Priority	Medium

Rock/Williams Creek Subbasin

GADDIS CREEK

ROCK CREEK

WILLIAMS CREEK

GARRARD
CREEK
WAU

CHEHALIS RIVER

DAVIS CREEK

BLOOMQUIST CREEK

GARRARD CREEK

KELLOGG CREEK

GARRARD CREEK

FOREST CREEK

SOUTH FORK
GARRARD CREEK

N

3   0   3   Miles

Rock/Williams Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. Road density is fair (2.7 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**M -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **M -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG). Rip-rap, channel incision due to logging and roads.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Fair (DG) in Rock Creek; Poor (DG) in Williams Creek. Fair road density, livestock access in lower reaches. Bank erosion in Williams.	**M –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Reduce livestock access to both Rock Creek and Williams Creek. **L -** Provide education regarding the impacts of livestock.		**H -** Inventory roads and bank erosion, and assess causes and impacts to salmonids and prioritize restoration actions accordingly.
LWD	DG (Suspect Poor). Limited numbers and type of LWD.	**H –** Priority depends on results in assessment. Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration)..	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement). **H -** Assess habitat conditions including LWD, riparian, and sediment.
Riparian	Poor (DG)	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M –** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions. **H -** Assess road density and riparian road impacts.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	DG. Poor riparian, livestock access, roads.	**H** - Actions need to address riparian and flow problems. **H** - Reduce livestock access to both Rock Creek and Williams Creek. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H**- Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor (DG). Poor hydrologic maturity, low summer flows. "closed" to further appropriations.	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Install stream flow gage, and monitor stream flow.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Salzer Creek Subbasin

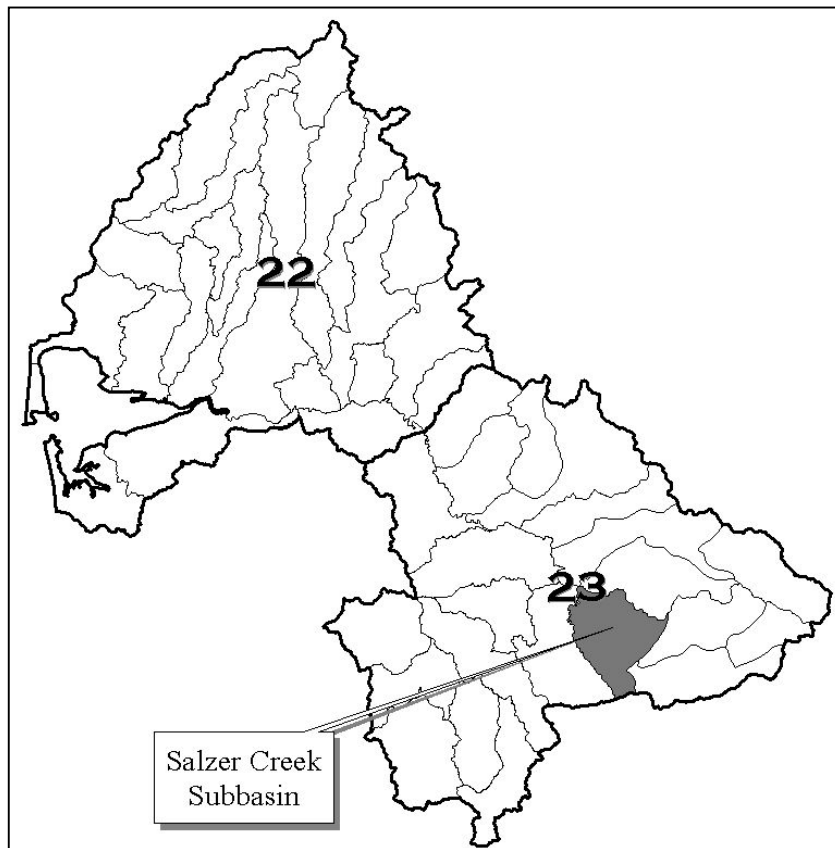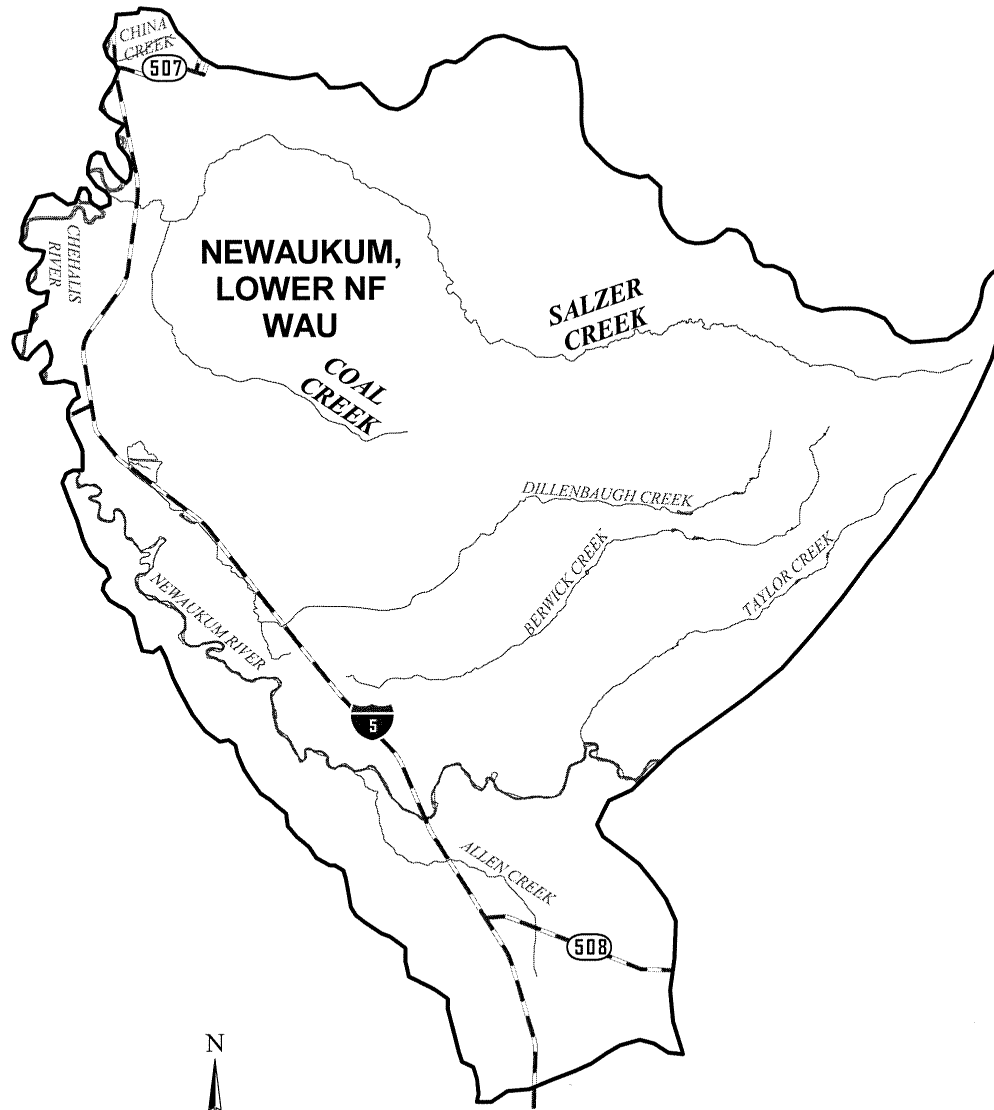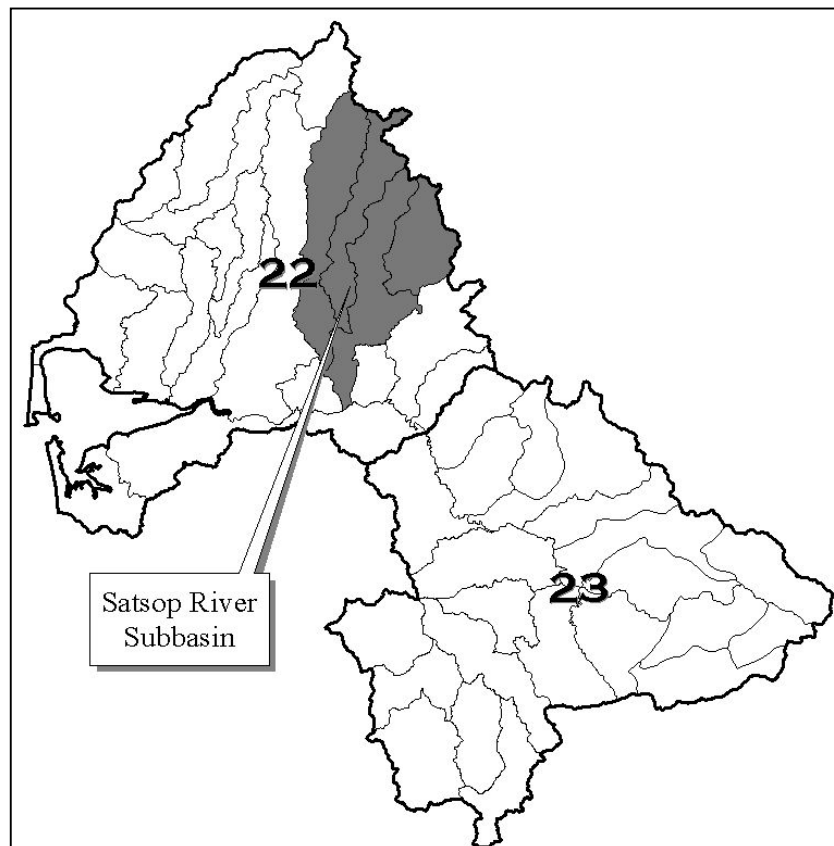|	
WAU Acreage	40,855.9
WAU's	Lower NF Newaukum
Major Tributaries	
Major Land Uses	Urban & rural residential, agriculture
Landownership	Private
Number and Type of Anadromous Fish Stocks	1: coho
Number of Anadromous Fish Habitat Miles	14.41 miles
Chehalis Watershed Subbasin Priority	Low

Salzer Creek
Subbasin

Salzer Creek Subbasin

CHINA CREEK

507

CHEHALIS RIVER

NEWAUKUM, LOWER NF WAU

SALZER CREEK

COAL CREEK

DILLENBAUGH CREEK

BERWICK CREEK

TAYLOR CREEK

NEWAUKUM RIVER

5

ALLEN CREEK

508

N

2   0   2 Miles

Salzer Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

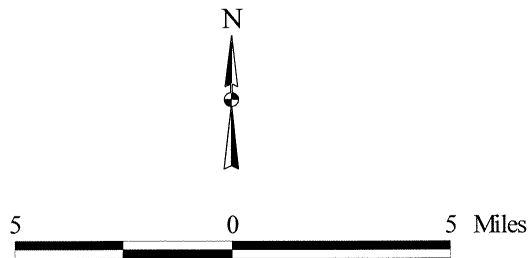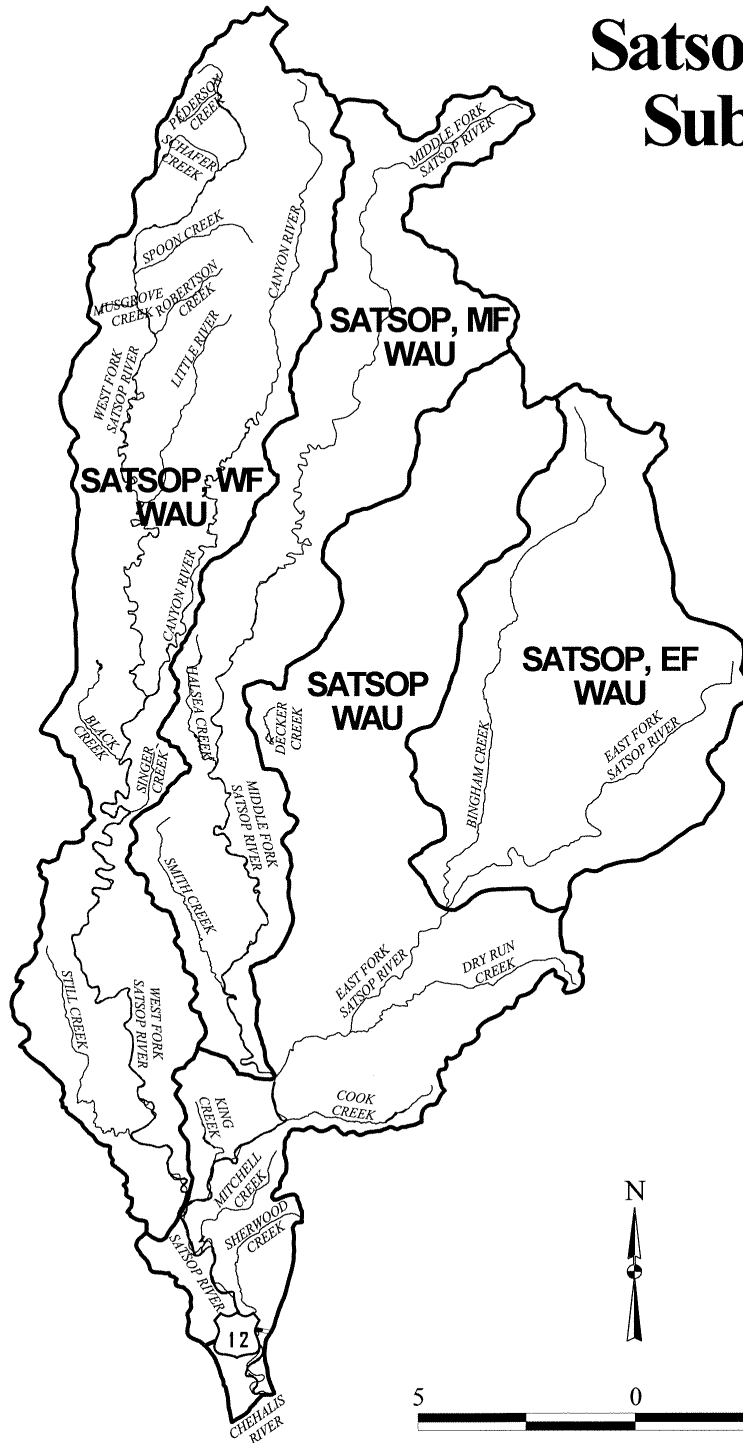| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. High road density (6 mi/sq mi).	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.	**H** - Preserve streams that allow access.	**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H** - Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	DG Poor in lower due to channelization.	**H** - Reconnect potential off-channel habitat. **H** - Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	DG	**H -** Reduce livestock access and bank erosion. **M -** Provide education regarding the impacts of livestock access to streams.		**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly.
Current In stream LWD	DG	**L -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**L** - Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (E.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).
Riparian	DG	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas. **H** - Restore riparian in lower watershed.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H** - Assess and prioritize recovery and protection for riparian conditions.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	Poor. Warm water temperature, low dissolved oxygen. Causes: livestock, processing plant, landfill, riparian loss.	**H** - Actions need to address riparian, point source, and livestock waste problems. **H** - Reduce livestock access to streams. **H** - Implement TMDL for water temperature and pH. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **H** – Preserve all streams with better than poor water quality.	**H** – Continue to monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor. "Closed" to further water allocations.	**H -** Reduce water withdrawals from both surface and ground sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **H** – Place a moratorium on any further water withdrawals.	**H** – Determine where water can be redirected to improve quantities.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid distribution, escapements, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Satsop River Subbasin

WAU Acreage	192,052.6
WAU's	EF, MF, and WF Satsop
Major Tributaries	East, Middle, & West Forks, Bingham & Cook, Dry Run, Decker, Baker, Rabbit, Smith, Black, and Still Creeks
Major Land Uses	Lower reaches agriculture and middle and upper forestry
Landownership	Mostly private with some public (USFS)
Number and Type of Anadromous Fish Stocks	5: summer chinook, fall chinook, coho, winter steelhead, chum
Number of Anadromous Fish Habitat Miles	237.58 miles
Chehalis Watershed Subbasin Priority	High

Satsop River Subbasin

Satsop River Subbasin

SATSOP, MF WAU

SATSOP, WF WAU

SATSOP WAU

SATSOP, EF WAU

PEDERSON CREEK

SCHAFER CREEK

MIDDLE FORK SATSOP RIVER

SPOON CREEK

CANYON RIVER

MUSGROVE CREEK

ROBERTSON CREEK

WEST FORK SATSOP RIVER

LITTLE RIVER

CANYON RIVER

WALSEA CREEK

BLACK CREEK

SINGER CREEK

DECKER CREEK

BINGHAM CREEK

EAST FORK SATSOP RIVER

SMITH CREEK

MIDDLE FORK SATSOP RIVER

STILL CREEK

WEST FORK SATSOP RIVER

EAST FORK SATSOP RIVER

DRY RUN CREEK

COOK CREEK

KING CREEK

MITCHELL CREEK

SHERWOOD CREEK

SATSOP RIVER

12

CHEHALIS RIVER

N

5　　　　0　　　　5　Miles

Satsop Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG (Suspect Poor). Known problems: high road density (4 mi/sq mi), limited refuge habitat.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks. **H -** Prioritize the restoration of culverts blocking passage in the WF and MF Satsop due to limited winter refuge. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	DG. Known problems: limited refuge habitat.	**H -** Reconnect potential off-channel habitat. Follow recommendations in Ralph et al. 1994. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). Known problems: very high sediment loads (sidecast roads) and sediment transport, high road densities, and low LWD.	**H-** Decommission roads at risk of landslides, especially side-cast roads. **H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **H –** Relocate gravel extraction activities away from shorelines and the 100-year floodplain. **H -** Reduce livestock access to streams, especially in Drybed, Decker, Bingham Creeks and the West Fork and East Fork Satsop Rivers. **L -** Provide education regarding the impacts of vehicle activity in streams and increase enforcement.		**H -** Inventory roads and assess impacts to salmon and steelhead as well as prioritize restoration actions. **H -** Inventory and prioritize sediment sources in the MF and EF Satsop watersheds.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
LWD	Poor in WF, DG elsewhere. Known problems: low LWD.	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring or recruiting in the system. Priority should be given to the WF and MF watersheds.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement)
Riparian	Poor (DG, based upon coarse data). Known problems: riparian loss, conversion to hardwoods.	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer and hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions in all areas of the Satsop except in the WF.
Water Quality	Poor, with some data gaps. Known problems: warm water temperatures likely due to poor riparian conditions, and high turbidity, related to sedimentation.	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Reduce livestock access to streams, especially in Drybed, Decker, Bingham Creeks and the West Fork and East Fork Satsop Rivers. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**M -** Monitor water temperature, dissolved oxygen, pH, and turbidity in each fork of the Satsop River.
Water Quantity	Poor in mainstem and MF; DG in WF; Good in EF. Known problems: increased peak flows, reduced hydrologic maturity, high risk of scour.	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H -** Investigate and prioritize causes of low summer flow in the lower Satsop River. **M -** Monitor scour in the WF, MF, and mainstem Satsop.
Biological Processes	Fair	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Scatter Creek Subbasin

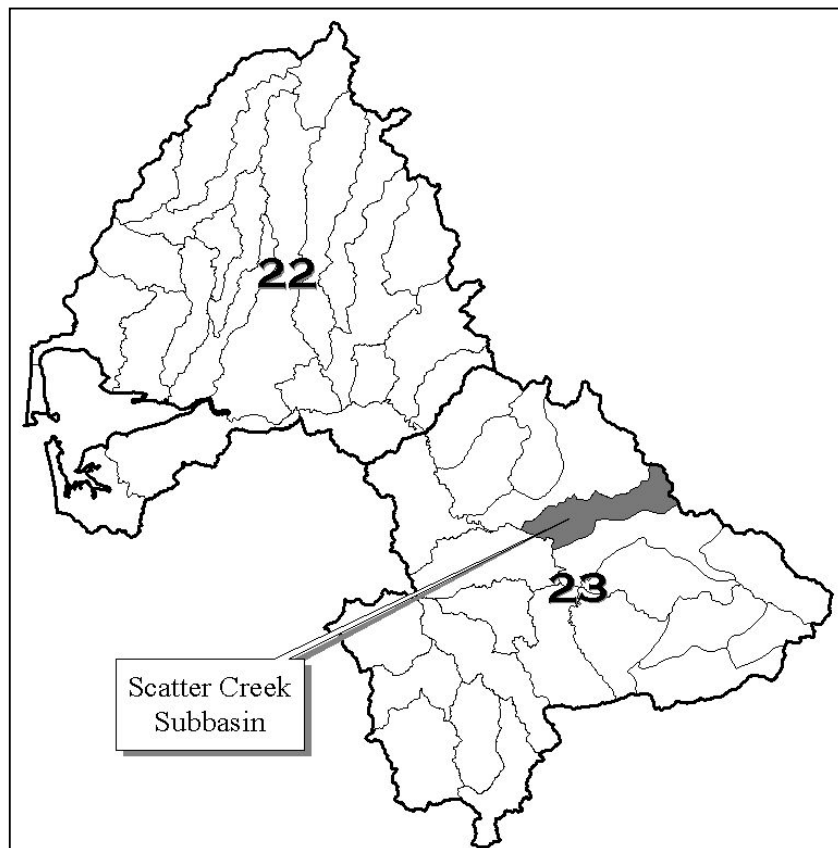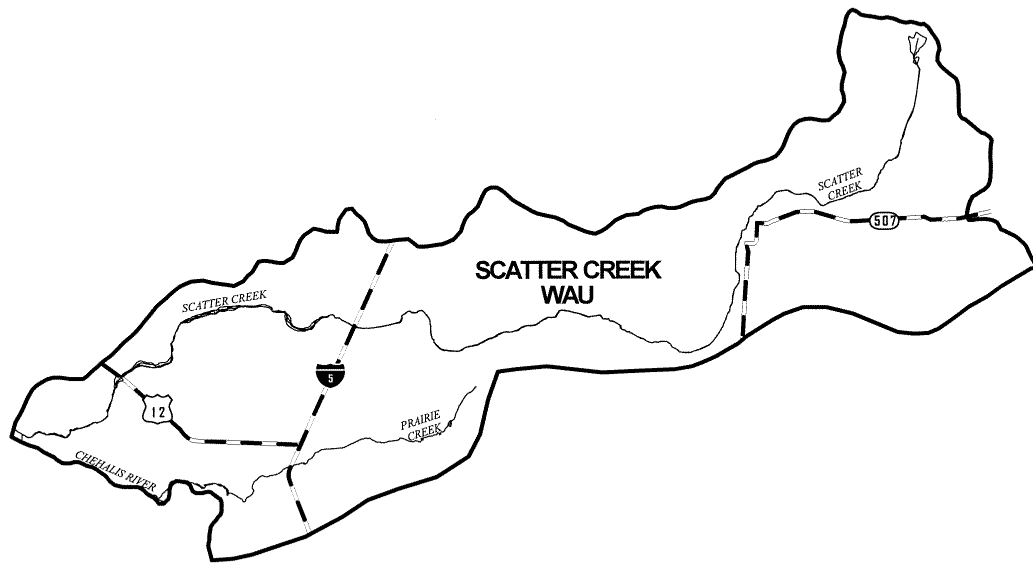|	
WAU Acreage	31,801.9
WAU's	Scatter Creek
Major Tributaries	
Major Land Uses	Agriculture and rural residential in lower areas, timber in upper areas
Landownership	Public and private
Number and Type of Anadromous Fish Stocks	2: coho & winter steelhead
Number of Anadromous Fish Habitat Miles	20.01 miles
Chehalis Watershed Subbasin Priority	Medium

Scatter Creek
Subbasin

SCATTER CREEK

SCATTER
CREEK

507

SCATTER CREEK
WAU

SCATTER CREEK

5

1 2

PRAIRIE
CREEK

CHEHALIS RIVER

N

4   0   4   Miles

Scatter Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	Good	**H** - Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H** - Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages. **L** – New culvert structures should be sized to reflect expected increased flows. (High 20 – 30 year precipitation cycle expected).		**L** - Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **L** - Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Good	**L** - Reconnect potential off-channel habitat. **H** - Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H** – Maintain, conserve and prioritize off-channel and side channel habitat and associated riparian.	**L** - Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor. High road density (5.3 mi/sq mi), excess sedimentation, livestock access, poor channel conditions.	**H** – Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H** – Reduce livestock access to streams. **L** – Provide education regarding the impacts of vehicle activity in streams and increase enforcement. **H** – Provide education regarding the impacts of livestock access and increase enforcement.		**H** - Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly.
LWD	Good	**L** - Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H** – Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**L** - Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor	**H** - Revegetate open riparian areas with native plants including conifers in appropriate places. **M** - Plant oaks and appropriate under-story plants in appropriate prairie areas. **M** – Interplant conifer into hardwood riparian areas that were historically conifer areas. **M**- Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H** - Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H** – Maintain and conserve existing functioning riparian areas.	**L** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Poor. 303(d) listing for water temperature, pH, and fecal coliform (suggesting high BOD loads). Causes include: poor riparian and livestock access.	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce livestock access to streams. **H** – Provide education regarding the impacts of livestock access and increase enforcement. **H** – Implement TMDL for water temperature and pH. Address fecal coliform as it relates to increased BOD loads. **H** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **H** – Prevent or slow down conversion of rain permeable land to impervious surfaces.	**H** – Continue to monitor water temperatures, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor. "Closed" to further water appropriations.	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce water withdrawals from both surface and ground sources. **H** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H** -Restore wetlands and off-channel habitat.	**H** - Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Assess actual and projected water use in areas of rapid residential and urban development (e.g., Rochester and Grand Mount) and potential impact on stream flows. **M** – Assess impact of groundwater pumping on stream flows.
Biological Processes	DG	**L** - Increase contribution of marine–derived nutrients through increased use of carcasses.		**H** - Increase field surveys for salmonid distribution, escapement, and habitat use by life history stage. **L** – Inventory macro-invertebrates to assess the abundance and diversity of "fish food". **L** – Assess marine-derived nutrient processes.

Skookumchuck Subbasin

WAU Acreage	125,388.1
WAU's	Lower, Upper Skookumchuck, and Hanaford
Major Tributaries	Hanaford, Salmon, Thompson, Johnson, Pheeny, Fall, Laramie, & Eleven
Major Land Uses	Forestry, urban and rural residential, mining & commercial
Landownership	Private and Public (USFS)
Number and Type of Anadromous Fish Stocks	4: spring chinook, fall chinook, coho, winter steelhead
Number of Anadromous Fish Habitat Miles	174.81 miles
Chehalis Watershed Subbasin Priority	High

Skookumchuck River Subbasin

Skookumchuck River Subbasin

N

6   0   6   Miles
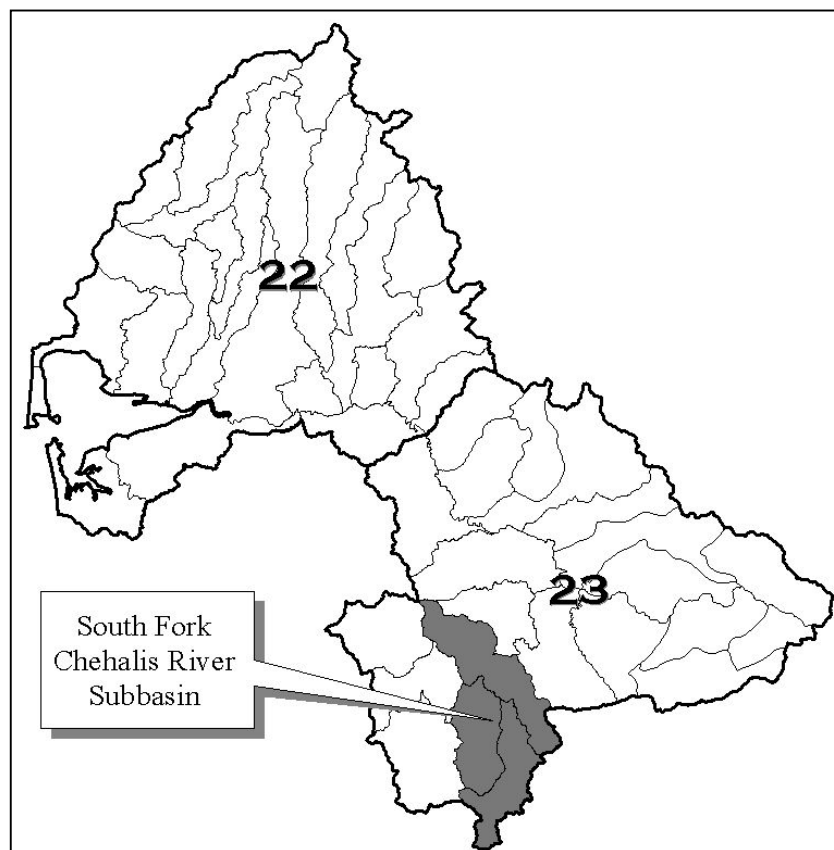
Skookumchuck River Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

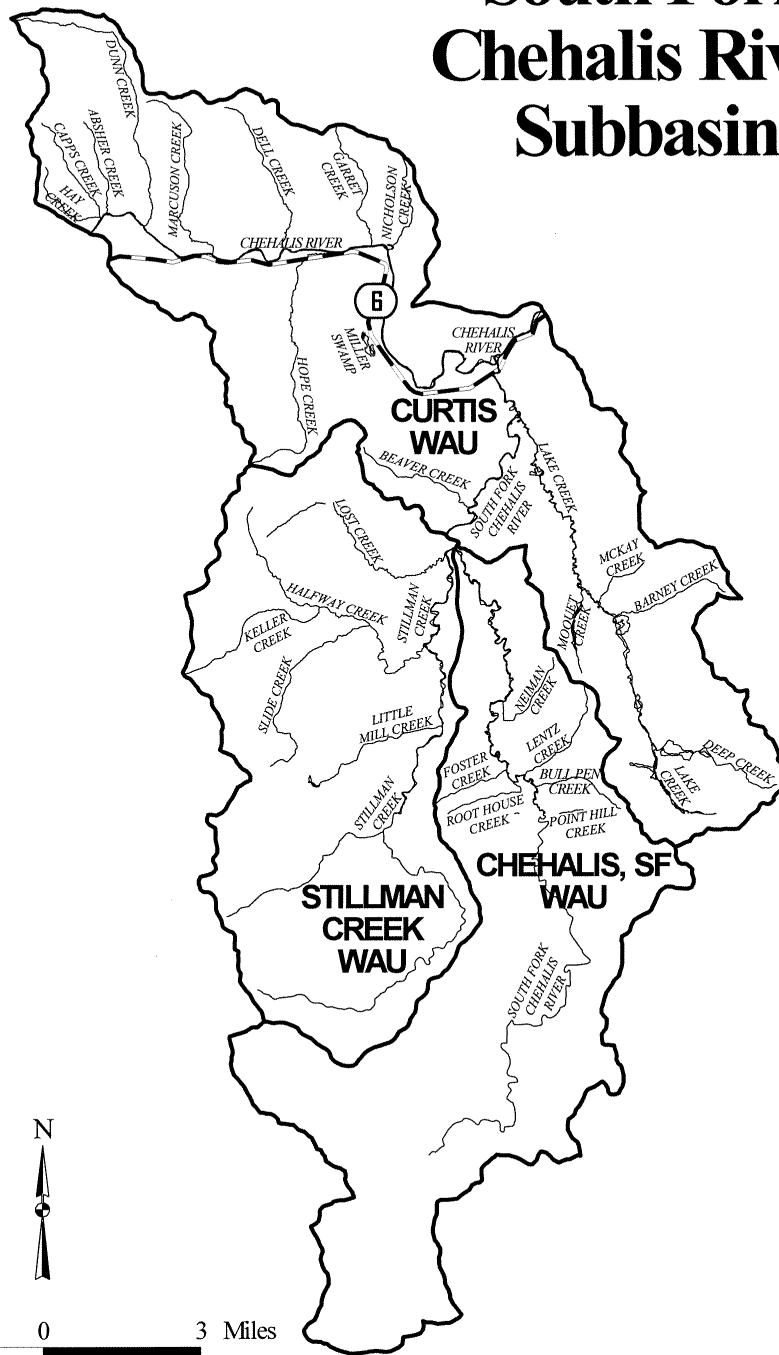| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. High road density (5.4 – 6.0 mi/sq mi)	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Fair in lower, poor in upper, poor in Hanaford Creek.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian. **H –** Preserve functional floodplain areas in the lower Subbasin.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG) in lower, good in upper. High road density, high levels of bank erosion and livestock access. In upper reaches, dam break floods.	**H -** Decommission roads at risk of landslides, especially side-cast roads. **H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **M -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **H -** Reduce livestock access to streams. **L -** Provide education regarding the impacts of vehicle activity in streams and increase enforcement. **H -** Provide education regarding the impacts of livestock access.		**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
LWD	DG – In Lower. Fair – Poor in upper.	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (E.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).
Riparian	Poor	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Poor. Warm water temperatures, failing septics, agriculture and industrial waste, coal mining.	**H -** Actions need to address riparian and flow problems. **H -** Reduce livestock access to streams. **H -** Implement TMDL for water temperature and pH. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Continue to monitor water temperature, dissolved oxygen, pH, and turbidity. **H –** Assess mercury in coal piles in the Hanaford Creek watershed.
Water Quantity	Poor. Closed to further water appropriations. Users: irrigators, mining, quarries, cities, livestock.	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Reduce water withdrawals from both surface and ground sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Continue to monitor stream flow. **H –** Assess actual water usage and compare to water rights.
Biological Processes	Poor (DG)	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

South Fork Chehalis River Subbasin

WAU Acreage	106,388.6
WAU's	Curtis, Stillman Creek, & SF Chehalis
Major Tributaries	Lake, Stillman, Lentz, Beaver, Hanlan, Black, & Cedar Creeks
Major Land Uses	Agriculture, rural residential, forestry
Landownership	Private
Number and Type of Anadromous Fish Stocks	4: spring chinook, fall chinook, coho, & winger steelhead
Number of Anadromous Fish Habitat Miles	100.14 miles
Chehalis Watershed Subbasin Priority	High

South Fork Chehalis River Subbasin

South Fork Chehalis River Subbasin

South Fork Chehalis Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG, Suspect Poor. High road density 3.7 in South Fork to 4.5 mi/sq mi in Stillman Creek. Also, large number of potentially-blocking culverts and limited rearing habitat.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Fair to Good (DG) Rip-rap.	**M -** Reconnect potential off-channel habitat. **M -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels. **H -** Reduce bank protection.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian. **H -** Prevent further diking, rip-rap, and other bank protection.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). High road densities, landslides and debris torrents (Stillman), high bank erosion and livestock access.	**H -** Decommission roads at risk of landslides, especially side-cast roads. **H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **H –** Reduce livestock access to streams. **H -** Reduce human-caused bank erosion. **M -** Provide education regarding the impacts livestock access.	**H -** Protect existing good quality spawning habitat. **M -** Prevent further degradation of human-induced banks instability.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H -** Inventory, prioritize, and list causes of bank erosion.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
LWD	Poor (DG)	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential. This priority level might change to high after assessment in lower reaches is completed.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement). **M -** Conduct surveys to determine LWD levels, pool habitat, and riparian conditions in the lower drainage.
Riparian	Poor	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer and hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Poor (DG). Warm water temperatures, poor riparian, livestock access.	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Reduce livestock access to streams. **H -** Implement TMDLs for water temperature and pH. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Continue to monitor water temperature, dissolved oxygen, pH, and turbidity. Begin monitoring Lake Creek.
Water Quantity	Poor (DG). Not meeting base flows in the South Fork. Peak flow concerns in Stillman Creek. Poor hydrologic maturity in Lake Creek.	**H -** Reduce water withdrawals from both surface and ground sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Monitor stream flows.
Biological Processes	Good (DG)	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Stearns Creek Subbasin

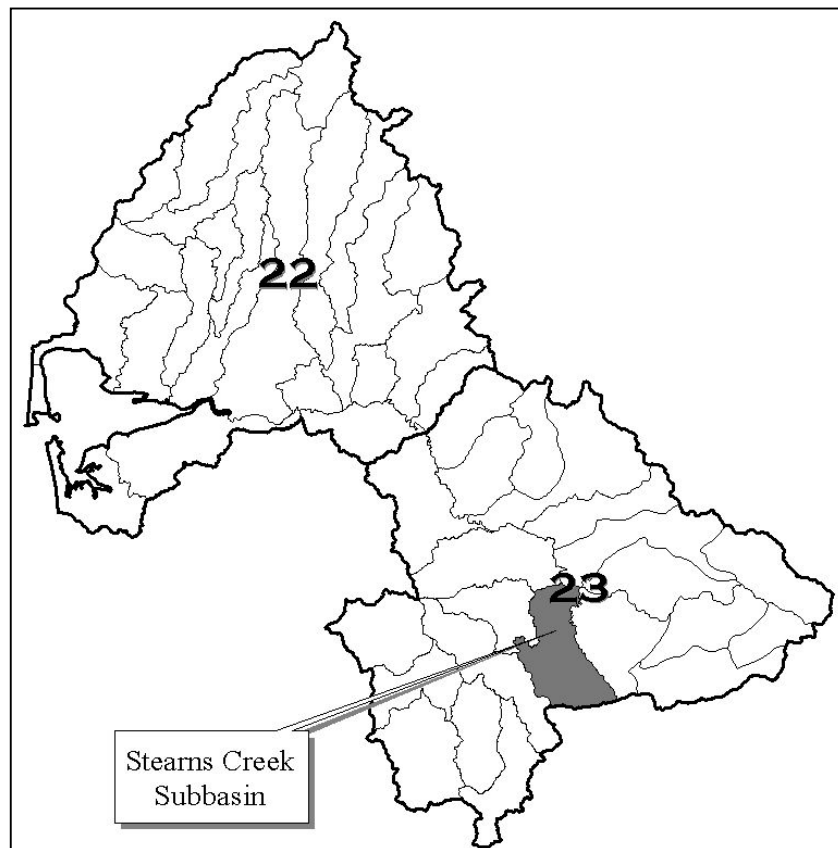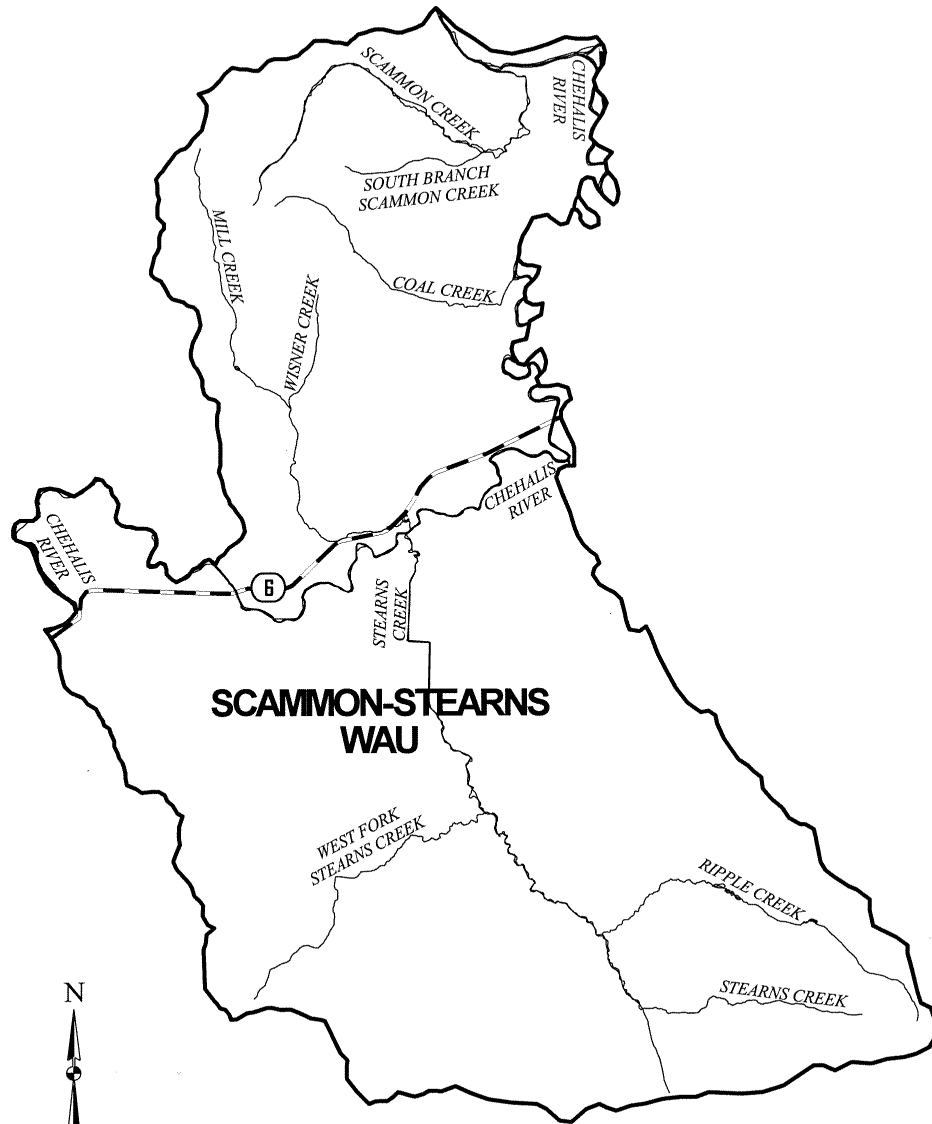|	
WAU Acreage	45,089.4
WAU's	Scammon-Stearns
Major Tributaries	
Major Land Uses	Agriculture and rural residential in lower & middle sections, forestry in upper
Landownership	Private
Number and Type of Anadromous Fish Stocks	2: coho, winter steelhead
Number of Anadromous Fish Habitat Miles	13.23 miles
Chehalis Watershed Subbasin Priority	Low

Stearns Creek Subbasin

SCAMMON CREEK

CHEHALIS RIVER

SOUTH BRANCH SCAMMON CREEK

MILL CREEK

WISNER CREEK

COAL CREEK

CHEHALIS RIVER

CHEHALIS RIVER

6

STEARNS CREEK

SCAMMON-STEARNS WAU

WEST FORK STEARNS CREEK

RIPPLE CREEK

STEARNS CREEK

N

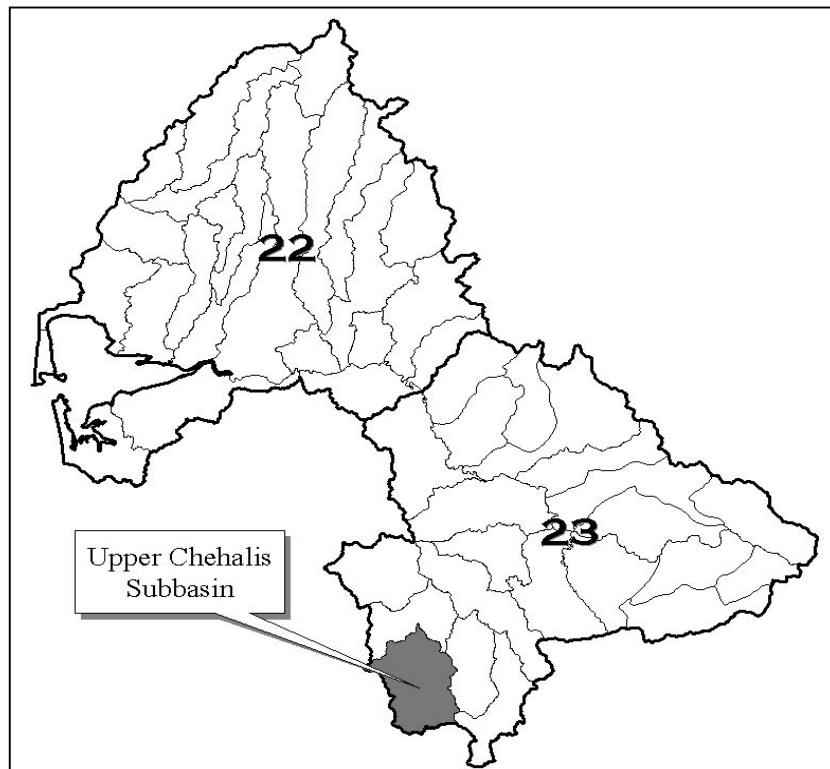3   0   3 Miles

Stearns Creek Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

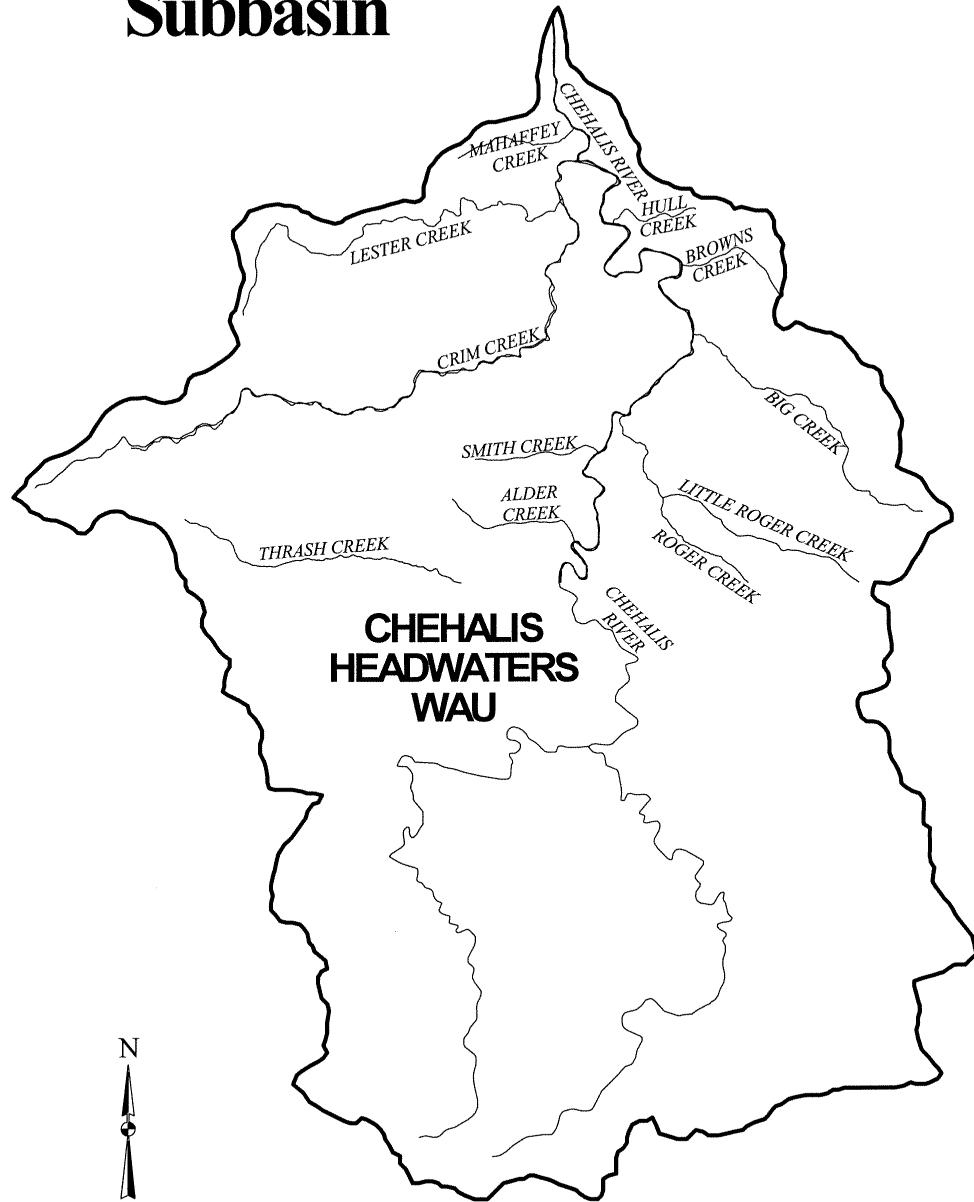| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG, Suspect Poor. High road density (4.9 mi/sq mi) and initial culvert inventory lists extremely high number of potential blockages.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG). Channelization and floodplain road.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels. **H -** Reduce bank protection.	**H –** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian. **H -** Prevent further diking, rip-rap, and other bank protection.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG). High road densities and high levels of bank erosion.	**H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H –** Reduce livestock access to streams. **M -** Provide education regarding the impacts of livestock access.	**H -** Protect existing good quality spawning habitat.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H -** Inventory, prioritize, and list causes of bank erosion.
LWD	DG (likely poor)	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration). This priority level might change to high after assessment in lower reaches is completed.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement). **M -** Conduct surveys to determine LWD levels, pool habitat, and riparian conditions in the lower drainage.
Riparian	Poor	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer and hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H -** Assess and prioritize recovery and protection for riparian conditions.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Water Quality	Poor. Low dissolved oxygen from livestock inputs. Poor riparian conditions suggest temperature problems.	**H** - Actions need to address riparian and flow problems. **H** - Reduce livestock access to streams. **H** - Implement TMDL for water temperature and pH. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Continue to monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor (DG). Low summer flows, poor hydrological maturity.	**H -** Reduce water withdrawals from both surface and ground sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** – Continue monitoring stream flows.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Upper Chehalis River Subbasin

WAU Acreage	45,000.2
WAU's	Chehalis Headwaters
Major Tributaries	East & West Forks, Elk, Rock, Crim, Big, Thrash, Cinnabar, Nicholson, Garret, Hope, Dell, Marcuson, Dunn, and Absher Creeks
Major Land Uses	Forestry
Landownership	Private
Number and Type of Anadromous Fish Stocks	4: spring chinook, fall chinook, coho, & winter steelhead
Number of Anadromous Fish Habitat Miles	48.91 miles
Chehalis Watershed Subbasin Priority	Medium

Upper Chehalis Subbasin

MAHAFFEY CREEK

CHEHALIS RIVER

HULL CREEK

BROWNS CREEK

LESTER CREEK

CRIM CREEK

BIG CREEK

SMITH CREEK

ALDER CREEK

LITTLE ROGER CREEK

THRASH CREEK

ROGER CREEK

CHEHALIS HEADWATERS WAU

CHEHALIS RIVER
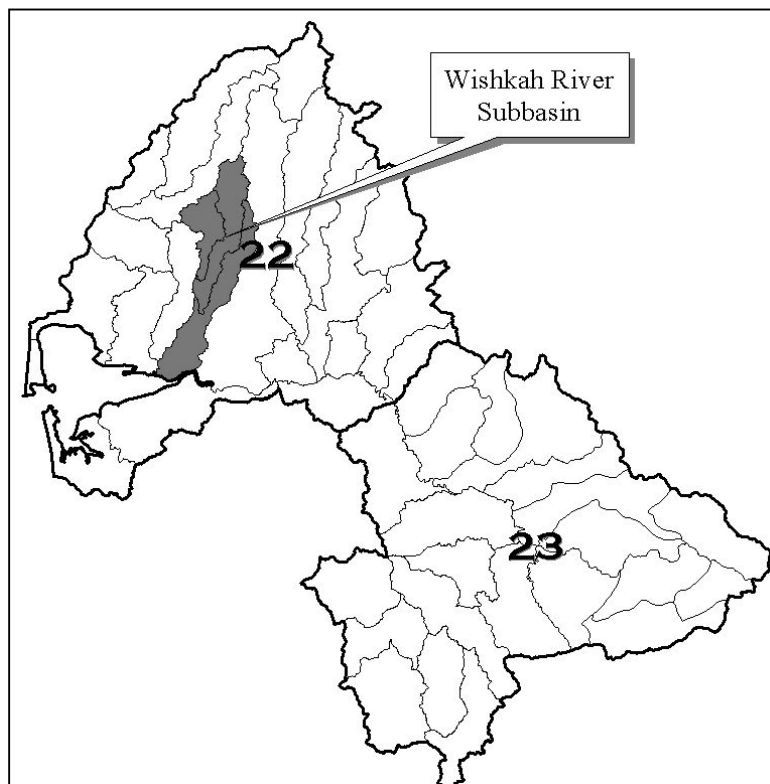
N

2   0   2 Miles

Upper Chehalis Subbasin (all waters upstream of Pe Ell except Rock Creek)
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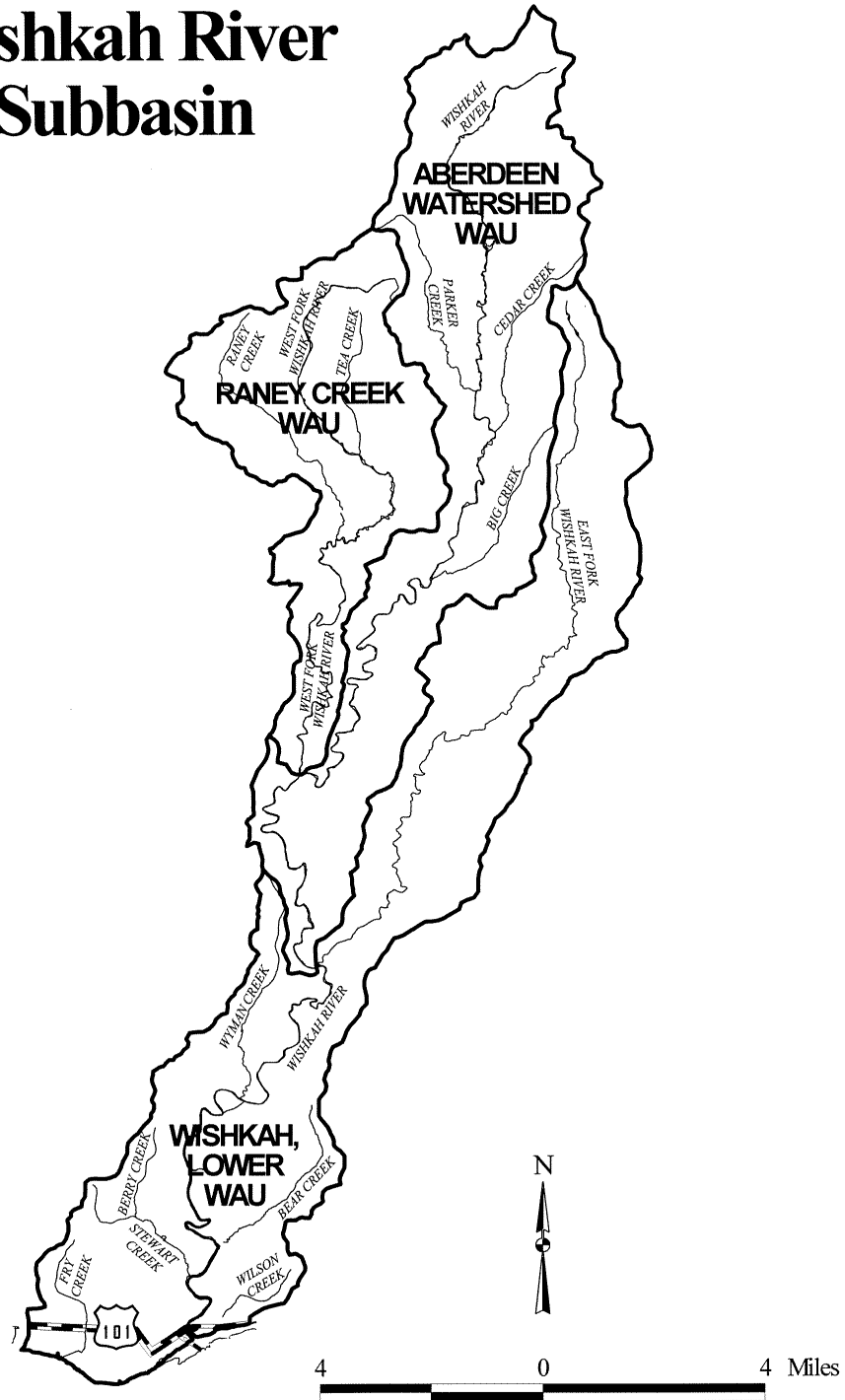| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	
Fish Passage	Poor (DG) Numerous culverts, high road density, limited rearing habitat.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG) in all streams but Crim, Thrash, Cinnabar, and the East Fork Chehalis River. Channel incision, rip-rap. .	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H –** Maintain, prioritize, and conserve off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor High road density, landslides caused by roads, debris torrents, channel instability.	**H -** Decommission roads at risk of landslides, especially side-cast roads. **H –** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **H -** Reduce livestock access to streams. **M -** Provide education regarding the impacts of livestock access to streams.	**H -** Enforce new forest practice regulations.	**H -** Inventory roads and landslides and assess impacts to salmonids and prioritize restoration actions accordingly.
LWD	Poor	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Mixed, but mostly Fair	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **H -** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H** – Continue enforcement and revision of current regulations that preserve and enhance riparian regeneration.	**H** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Poor. Warm water temperatures and loss of riparian canopy.	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce livestock access to streams. **H** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Monitor water temperature, dissolved oxygen, pH, and turbidity. **H** - Assess culvert sizing.
Water Quantity	DG. Recent logging likely reduced hydrological maturity, concern about peak flows, water withdrawals.	**H** - Actions need to address sediment, riparian, and flow problems. **H** - Reduce water withdrawals from surface sources. **H** - Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H** - Install stream flow gage and monitor stream flow. **H** - Assess actual water use and water rights. **H** - Update land cover data (hydrological maturity).
Biological Processes	DG, likely good.	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L** - Assess marine-derived nutrient processes.

Wishkah River Subbasin

WAU Acreage	69,767.3
WAU's	Lower Wishkah, Aberdeen Watershed, & Raney Creek
Major Tributaries	East and West Forks, Big, Raney and Wyman Creeks
Major Land Uses	Mostly forestry, urban (Aberdeen), agricultural, rural residential in lower areas
Landownership	Mostly private
Number and Type of Anadromous Fish Stocks	4: fall chinook, coho, winter steelhead, chum
Number of Anadromous Fish Habitat Miles	86.63 miles
Chehalis Watershed Subbasin Priority	High

Wishkah River Subbasin

ABERDEEN WATERSHED WAU

WISHKAH RIVER

PARKER CREEK

CEDAR CREEK

RANEY CREEK

WEST FORK WISHKAH RIVER

TEA CREEK

RANEY CREEK WAU

BIG CREEK

EAST FORK WISHKAH RIVER

WEST FORK WISHKAH RIVER

WYMAN CREEK

WISHKAH RIVER

WISHKAH, LOWER WAU

BERRY CREEK

BEAR CREEK

STEWART CREEK

FRY CREEK

WILSON CREEK

N

4   0   4 Miles

Wishkah River Subbasin
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Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG High road density (3.36 miles/square mile)	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species throughout all life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dams, dikes, railroad grades, etc.). Passage structures should be designed to allow passage for all fish species throughout all life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data. **H –** Assess fish passage at dam.
Floodplain Conditions	Poor in lower (developed); fair to good in upper (DG).	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H -** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment	Poor (DG) in lower; fair (DG) in upper. High Road density, timberland in upper reaches, landslides related to sidecast roads.	**H-** Decommission roads at risk of landslides, especially side-cast roads. **H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **L –** Reduce livestock access. **H –** Address the issues of coarse sediment blockage by the dam and ramping rates for minimal sediment input.		**H -** Inventory roads and assess impacts to salmonids as well as prioritize restoration actions.
LWD	DG	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration)..	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement).

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor in lower; fair in upper. Landuse = Predominately timberland in upper Wishkah Lower 3 miles impacted by development	**H -** Revegetate open riparian areas with native plants including conifers in historical/appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer/hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations.	**H** - Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Good	**L** - Actions need to address sediment, riparian, and flow problems. **L** - Reduce livestock access to streams. **L -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **L** - Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**L -** Conduct water quality assessment to determine specific sources attributing to water quality issues, and identify activities to correct water quality.
Water Quantity	Poor in lower; Good in upper based on hydrologic maturity.	**H -** Reduce water withdrawals from surface sources **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**M** – Install a stream flow gage, and monitor stream flows.
Biological Processes		**L-** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Workman Creek Subbasin

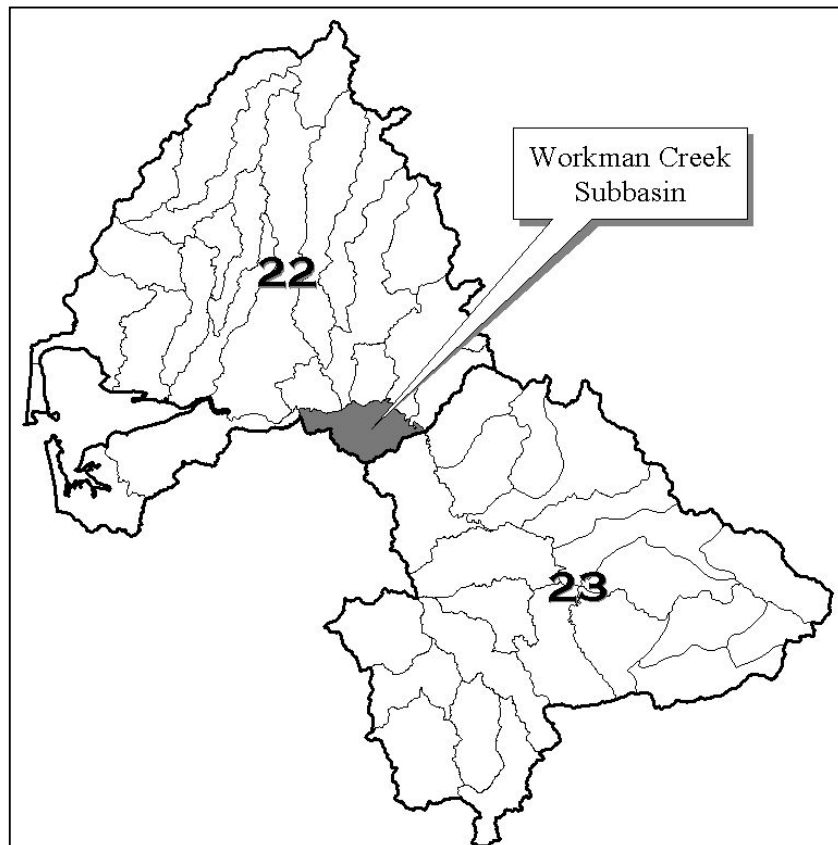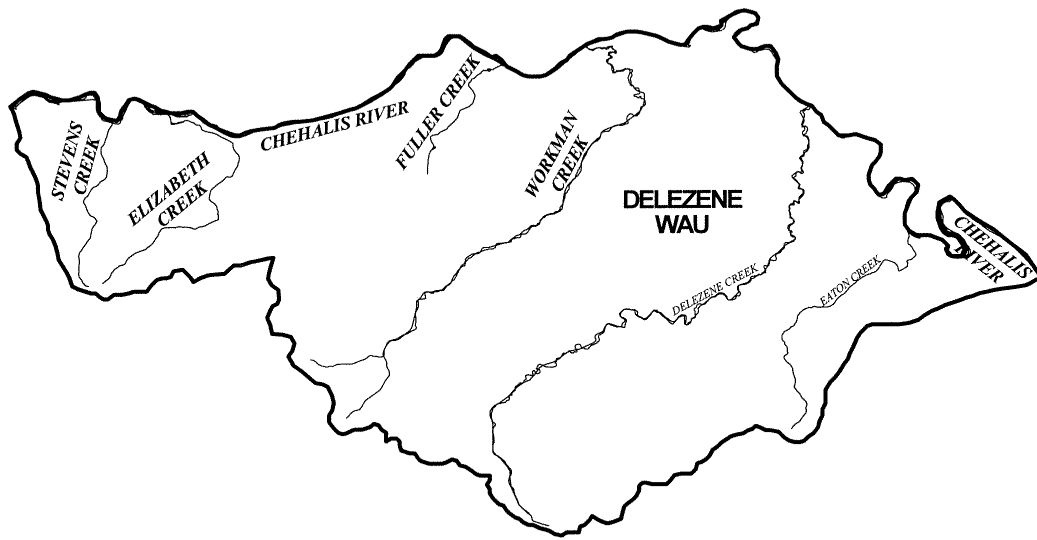|	
WAU Acreage	28,676.0
WAU's	Delezene
Major Tributaries	
Major Land Uses	Agriculture in lower areas, rural residential & forestry middle to upper areas
Landownership	Private and private
Number and Type of Anadromous Fish Stocks	0: Coho likely but not documented
Number of Anadromous Fish Habitat Miles	0
Chehalis Watershed Subbasin Priority	Low

Workman Creek
Subbasin

STEVENS CREEK

ELIZABETH CREEK

CHEHALIS RIVER

FULLER CREEK

WORKMAN CREEK

DELEZENE WAU

DELEZENE CREEK

EATON CREEK

CHEHALIS RIVER

N

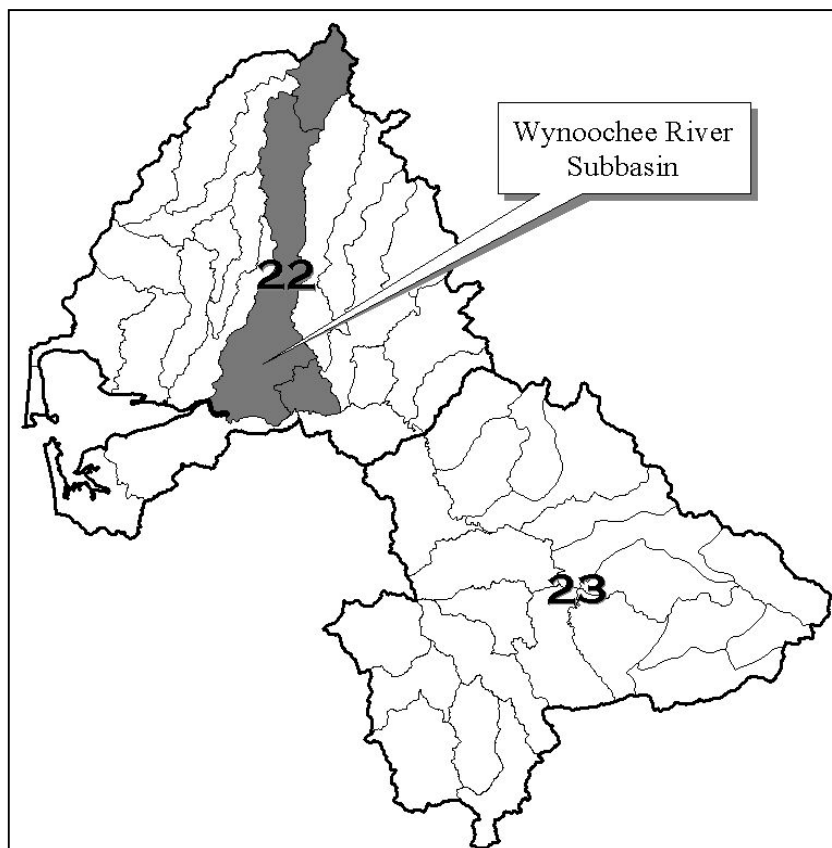3   0   3 Miles

Workman Creek Subbasin
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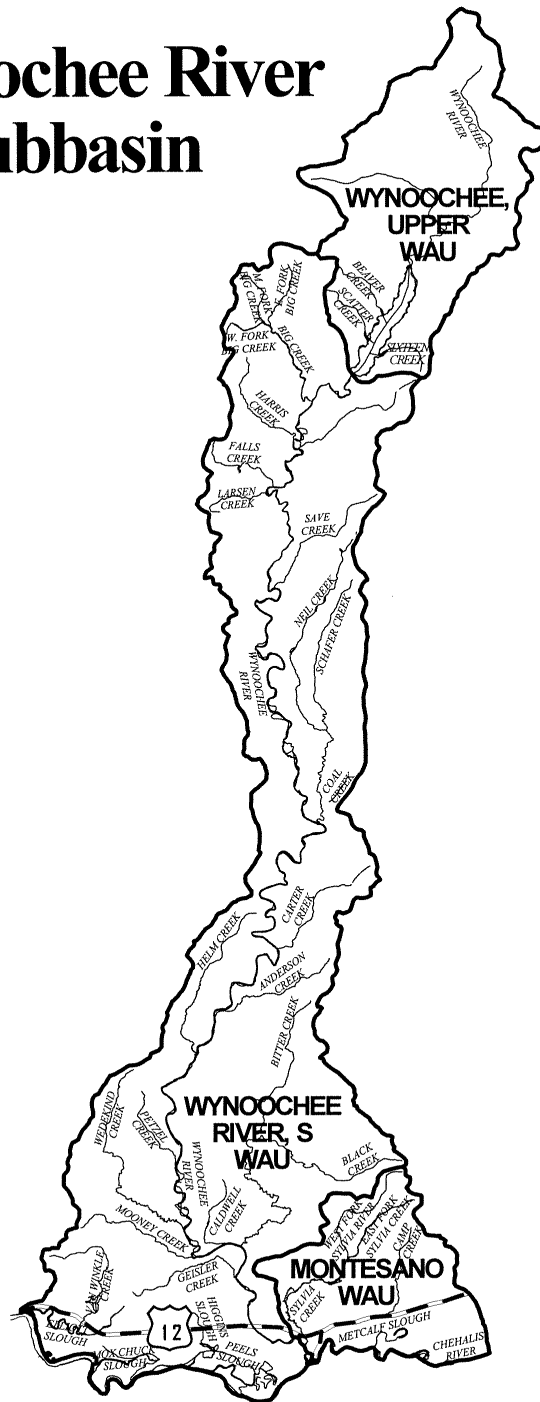| Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. High road density (4.6 mi/sq mi)	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks of salmon or steelhead. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	Poor (DG). Incision due to splash dams & historic logging practices.	**H -** Reconnect potential off-channel habitat. **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H -** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory. **H -** Assess and prioritize existing off-channel areas that are disconnected due to main channel incision.
Sediment	Poor (DG). Mass wasting, high road density, bank erosion, livestock impacts.	**H -** Decommission roads at risk of landslides, especially side-cast roads. **H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **M -** Reduce livestock access to streams.	**H -** Reduce activities in sensitive areas near stream.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H -** Assess mass wasting locations, bank failures, and sensitive geographic areas.
LWD	Poor (DG). Reduced due to splash dams And logging practices.	**H -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).. **H -** LWD needs to be of appropriate size.	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**H -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (e.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement)

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	Poor (DG) Logging impacts	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H –** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. .	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	DG Poor riparian, livestock access, road runoff.	**H -** Actions need to address sediment, riparian, and flow problems. **M -** Reduce livestock access to streams. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **M -** Reduce roads and logging in sensitive areas near streams.	**H -** Monitor water temperature, dissolved oxygen, pH, and turbidity.
Water Quantity	Poor (DG). Poor hydrological maturity.	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H -**Restore wetlands and off-channel habitat**.**	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **M -** Maintain remaining riparian vegetation along stream. **M -** Enforce new Timber regulations	**H -**Install stream flow gage and monitor stream flow.
Biological Processes	DG	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys regarding salmonid distribution, escapement, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.

Wynoochee River Subbasin

WAU Acreage	146,554.8
WAU's	Upper & S Wynoochee, Montesano
Major Tributaries	Carter, Schaefer, Big, Black, Helm, Wedekind Creeks
Major Land Uses	Mostly forestry, agriculture, urban (Montesano)
Landownership	Private, nearly 1/3 public (USFS)
Number and Type of Anadromous Fish Stocks	5: fall chinook, coho, winter steelhead, summer steelhead, chum, cutthroat, and sockeye
Number of Anadromous Fish Habitat Miles	151.33 miles
Chehalis Watershed Subbasin Priority	High

Wynoochee River Subbasin

WYNOOCHEE, UPPER WAU

WYNOOCHEE RIVER, S WAU

MONTESANO WAU

N

6   0   6 Miles

Wynoochee River Subbasin
These are the restoration, preservation, and data gap actions recommended by the Limiting Factors TAG.
The actions have been prioritized based upon the Limiting Factors Report coupled with professional judgement.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Fish Passage	DG. High road density in lower reaches, medium density in upper reaches.	**H -** Open three or more miles of good quality habitat used by at least one stock of salmon or steelhead. *Exceptions:* include very cost efficient projects addressing unique limiting habitat or benefiting multiple stocks. **H -** Bridges are the preferred structure. If culverts are used, they should be sized to allow full access to all fish species and life history stages.		**H -** Inventory, assess, and prioritize all habitat blockages (culverts, dikes, railroad grades, etc.) for all salmonid life history stages. **H -** Develop a database housed with the lead entity, to contain all blockage data.
Floodplain Conditions	DG – Poor in lower.	**H -** Reconnect potential off-channel habitat. **H –** Reconnect off-channel habitat identified in Ralph et al. (1994). **H -** Restoration actions need to increase instream LWD to help address channel incision and flow issues. This includes appropriate riparian restoration to result in better future LWD levels.	**H -** Maintain, conserve, and prioritize off-channel and side channel habitat and associated riparian.	**H -** Inventory impacts and suitable restoration sites for floodplain habitat coincident with the barrier/culvert inventory.
Sediment: Spawning gravel quantity	Poor, except in upper reaches. High road density, high bank erosion, landslides.	**H-** Decommission roads at risk of landslides, especially side-cast roads. **H -** Correct high impact road sediment delivery problems via push-outs, cross-drains, and sediment traps etc. **H -** Increase protection of steep and unstable slopes. **H -** Stabilize and revegetate exposed mass wasting sites to reduce surface erosion. **H –** Relocate gravel extraction activities away from shorelines and the 100-year floodplain. **H –** Reduce livestock access to Black Creek.	**H –** Preserve beaver dams in lower 28 miles.	**H -** Inventory roads and assess impacts to salmonids and prioritize restoration actions accordingly. **H –** Further study on WIN data.
LWD	DG	**M -** Actions are needed to increase LWD, or similarly functioning natural structures, in appropriate places. This would include anchoring LWD and increasing natural recruitment potential (riparian restoration).	**H –** Prevent removal of appropriate pieces of LWD, and other natural structures, within the floodplain through increased education and enforcement.	**M -** Determine appropriateness through inventory or other assessment of LWD, or other natural structure(s), placement. (E.g. gravel recruiting, hydrology, wood or structure size, gradient, near term LWD recruitment potential, and valley confinement) **M –** Characterize LWD in basin.

Limiting Factor	LF Rating	Restoration Actions	Preservation Actions	Data Gap Actions
Riparian	**POOR IN LOWER; POOR-FAIR IN MIDDLE; GOOD IN UPPER.**	**H -** Revegetate open riparian areas with native plants including conifers in appropriate places. **M -** Interplant conifer into hardwood riparian areas that were historically conifer areas. **M-** Plant conifer adjacent to and outside existing and limited existing conifer hardwood riparian areas.	**H -** Funds, lands, and easement opportunities should be identified to obtain areas of mid-to-late seral stage riparian with priority given to older stands. This is applicable to lands that do not have current protection such as those outside of current forest practice regulations. **H –** Preserve good riparian areas in upper.	**H -** Assess and prioritize recovery and protection for riparian conditions.
Water Quality	Poor. Warm water temperatures	**H -** Actions need to address sediment, riparian, and flow problems. **H -** Reduce livestock access to Black Creek. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrological maturity. **H -** Restore wetlands and off-channel habitat.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity.	**H –** Continue water quality monitoring, water temperatures, dissolved oxygen, pH, turbidity.
Water Quantity	Poor. Poor hydrologic maturity, dam operation, water withdrawals.	**H -** Reduce water withdrawals from surface sources. **H -** Increase activities that lead to natural recharge of the aquifers and maintain or improve hydrologic maturity. **H –** Dam operations should emulate natural flow conditions during adult migration and juvenile emigration periods. **H -** Restore wetlands and off-channel habitat. **H –** Restore water quantity and buy back water rights.	**H -** Decrease activities that interfere with the natural recharge of aquifers or degrade hydrological maturity. **H –** Place a moratorium on further water withdrawal.	**H –** Continue stream flow monitoring
Biological Processes	Good	**L -** Increase contribution of marine –derived nutrients through increased use of carcasses.		**H -** Increase field surveys for salmonid escapement, distribution, and habitat use by life history stage. **L -** Assess marine-derived nutrient processes.